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Murphy et al.

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(45) **Date of Patent: *Jun. 23, 2020**

(54) **MOBILE HOLOGRAM APPARATUS**

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(73) Assignee: **VIRTUAL MARKETING INCORPORATED**, Chicago, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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(51) **Int. Cl.**

G03H 1/22	(2006.01)
G03H 1/02	(2006.01)
G02B 30/56	(2020.01)

(52) **U.S. Cl.**
CPC ..... ***G03H 1/2202*** (2013.01); ***G03H 1/0236*** (2013.01); *G02B 30/56* (2020.01); (Continued)

(58) **Field of Classification Search**
CPC G02B 27/22; G02B 27/2235; G03H 1/22; G03H 1/2202; G03H 2001/2223;
(Continued)

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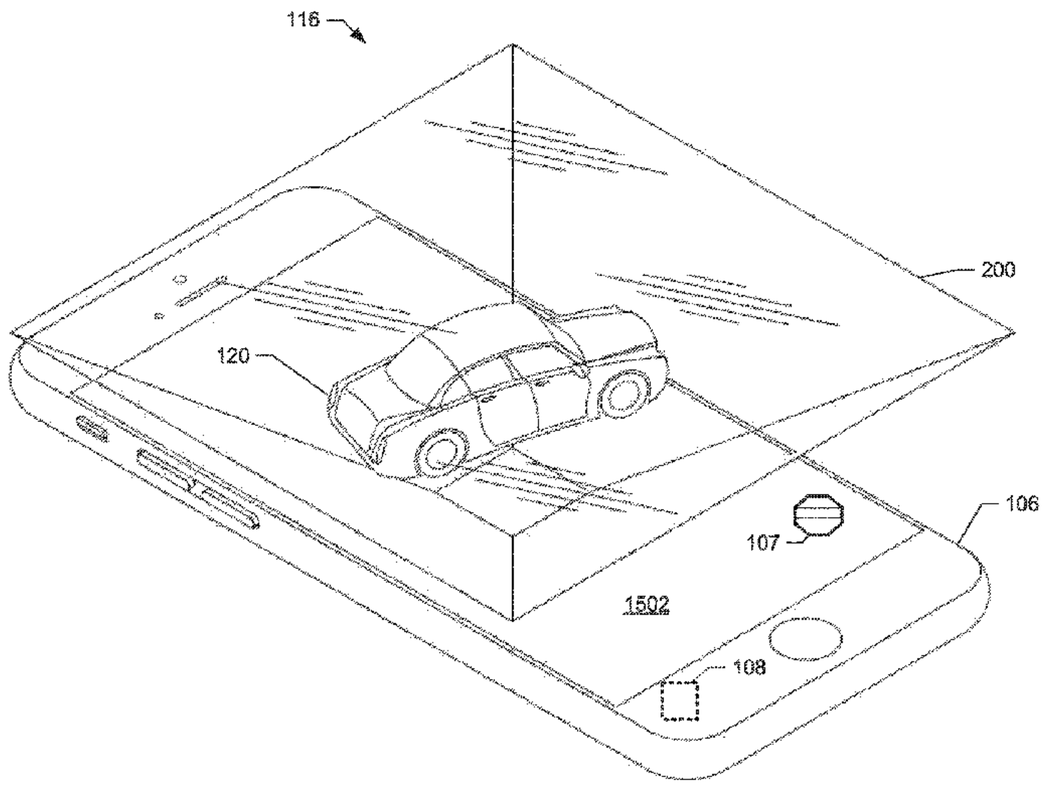
(74) *Attorney, Agent, or Firm* — K&L Gates LLP

(57) **ABSTRACT**

A mobile hologram apparatus is disclosed. An example apparatus includes a sheet folded along preformed creases into a pyramid structure configured to be actuated between a compressed state and an uncompressed state. The pyramid structure has a base section and a top section connected by four side sections. The pyramid structure in the compressed state has a height that is less than 1/10th the height of the pyramid structure in the uncompressed state. The apparatus also includes an elastic band connected to a perimeter of the base section of the pyramid structure and configured to cause the pyramid structure to self-actuate from the compressed state to the uncompressed state.

20 Claims, 17 Drawing Sheets



Related U.S. Application Data

application No. 29/569,369, filed on Jun. 27, 2016, now Pat. No. Des. 858,614.

(52) **U.S. Cl.**
CPC ... *G03H 1/2286* (2013.01); *G03H 2001/2231* (2013.01); *G03H 2227/02* (2013.01)

(58) **Field of Classification Search**
CPC ... G03H 2001/2228; G03H 2001/2231; G03H 2001/2234; G09F 19/12
USPC 359/1, 22, 23, 24, 25, 28, 32, 33, 34, 35, 359/462, 478; 353/7, 10, 30; 40/124.02, 40/124.08, 124.09, 124.14, 124.15, 40/124.16, 124.17, 124.18, 124.19, 539
See application file for complete search history.

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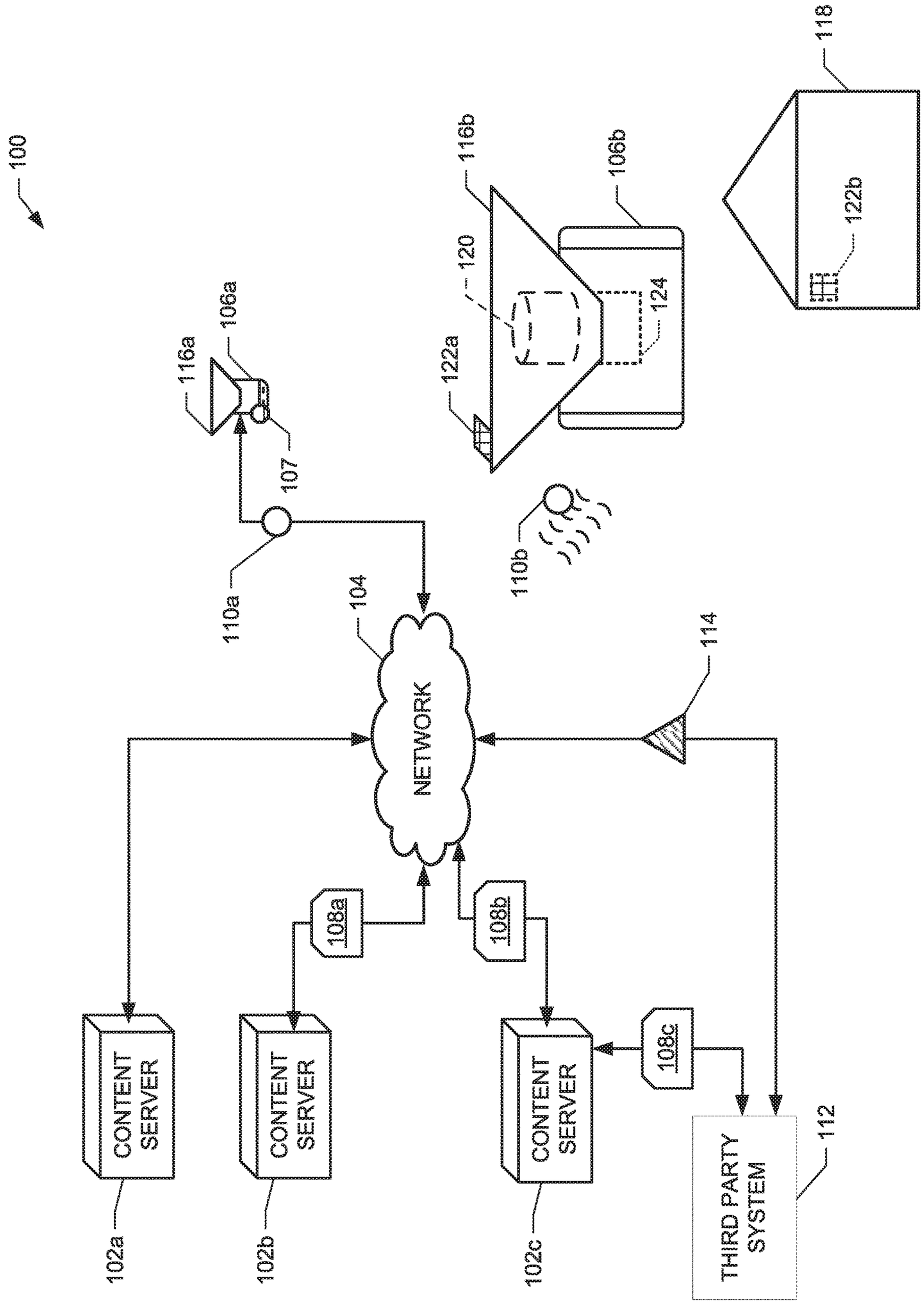
100
102a
CONTENT SERVER
102b
CONTENT SERVER
102c
CONTENT SERVER
104
NETWORK
106a
106b
107
108a
108b
108c
110a
110b
112
THIRD PARTY SYSTEM
114
116a
116b
118
120
122a
122b
124

FIG. 1

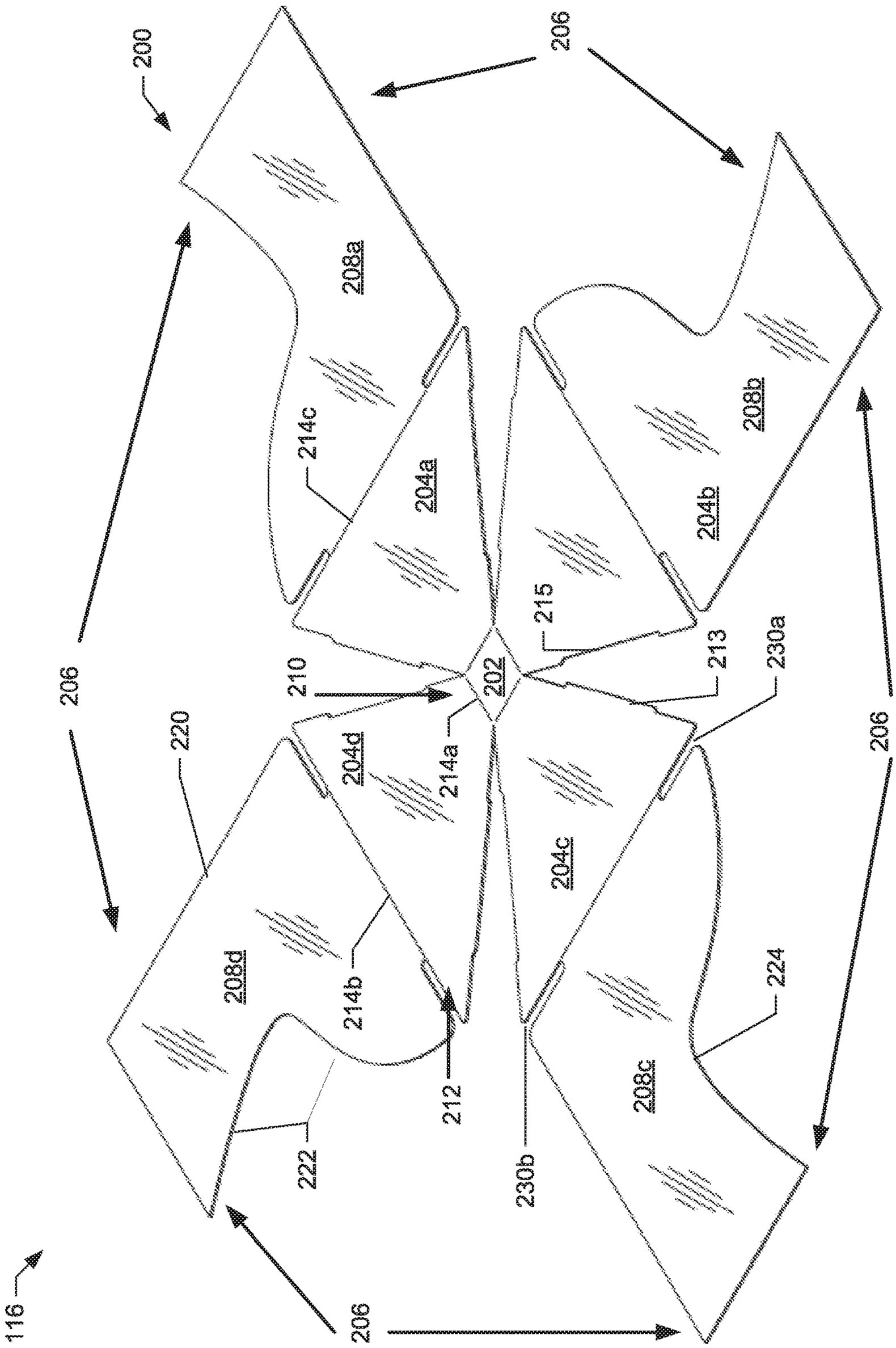
116
200
206
220
210
202
204d
214a
214c
204a
208a
215
213
230a
204b
208b
204c
208d
214b
212
222
230b
208c
224

FIG. 2

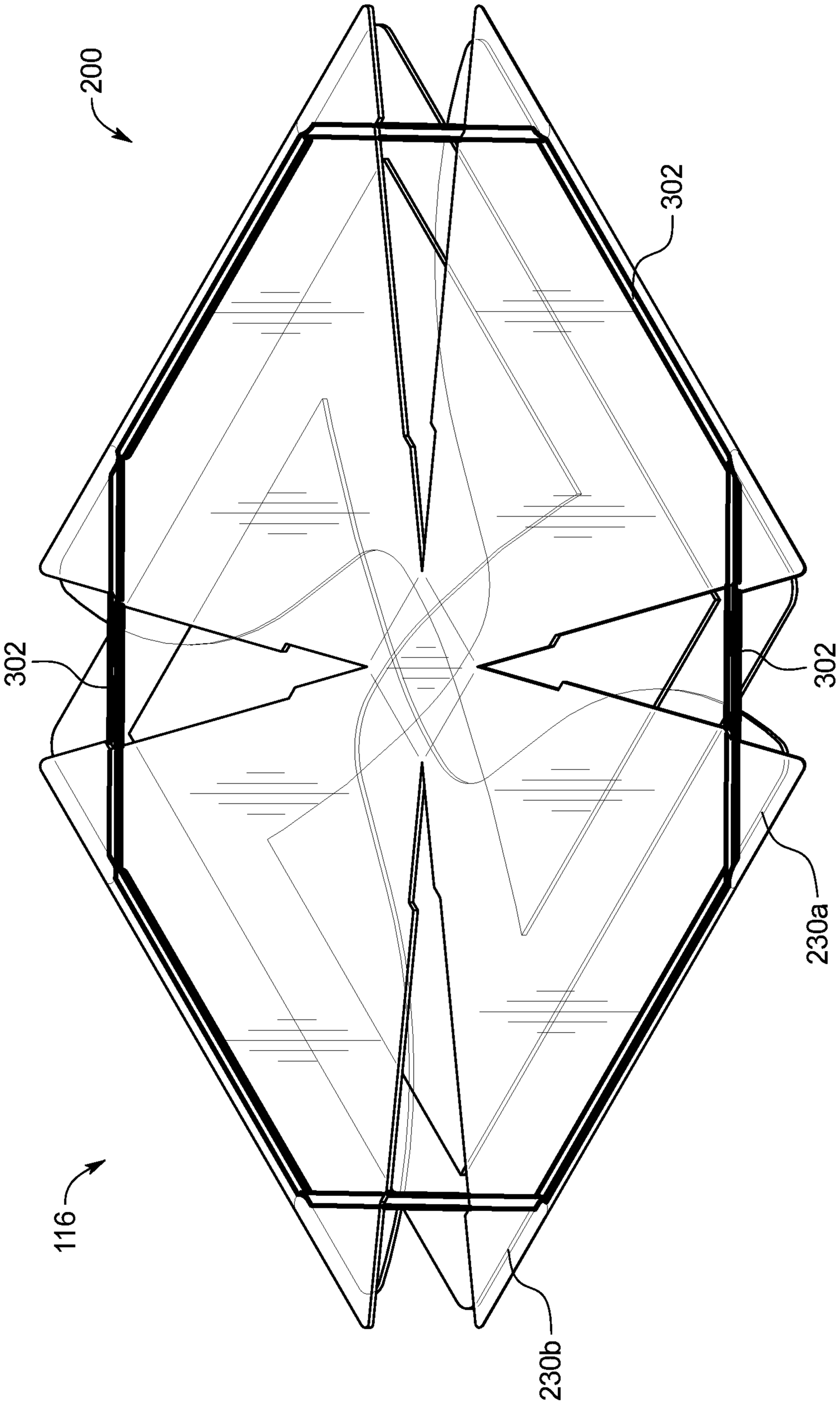

FIG. 3

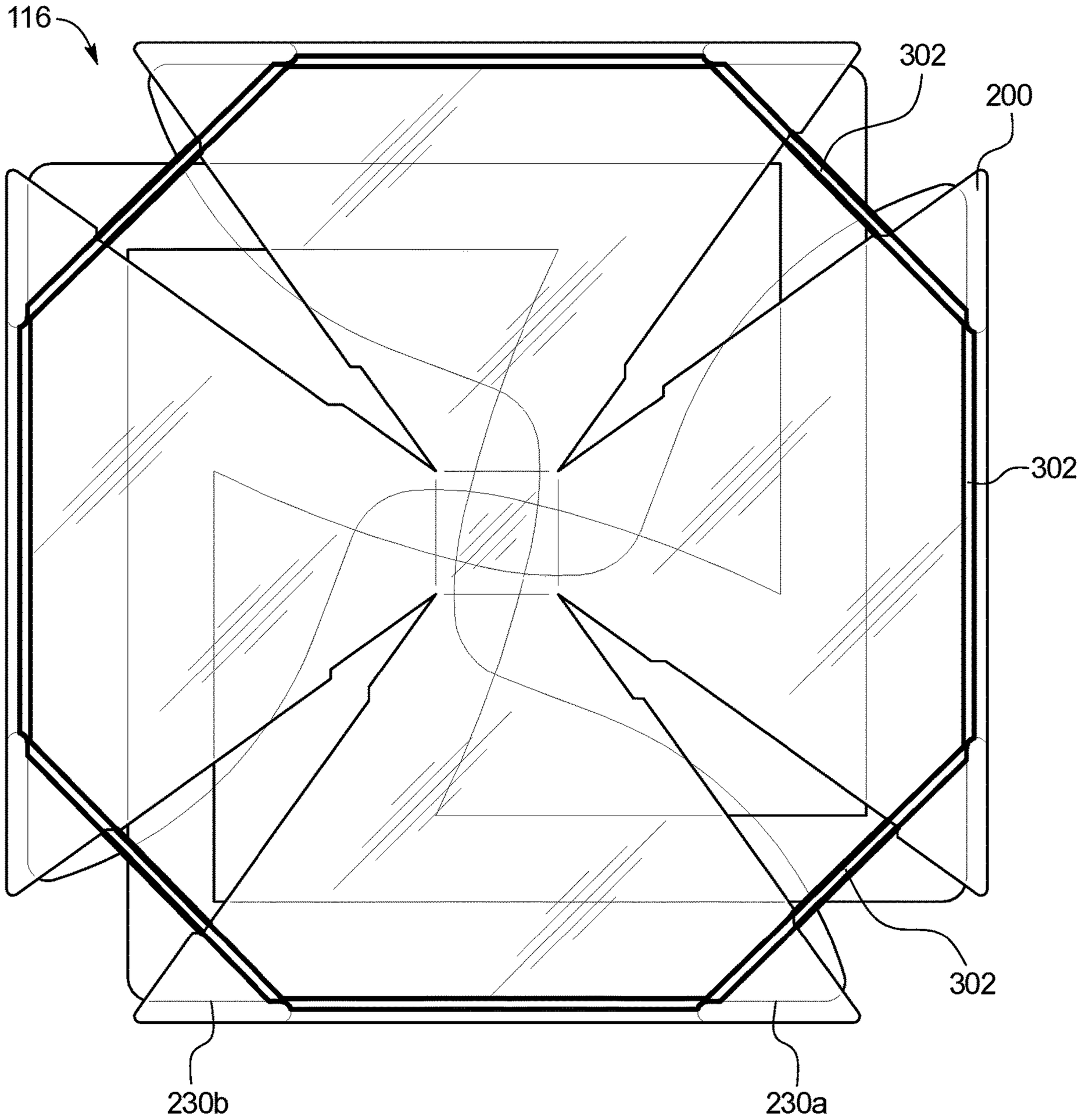

FIG. 4

FIG. 5

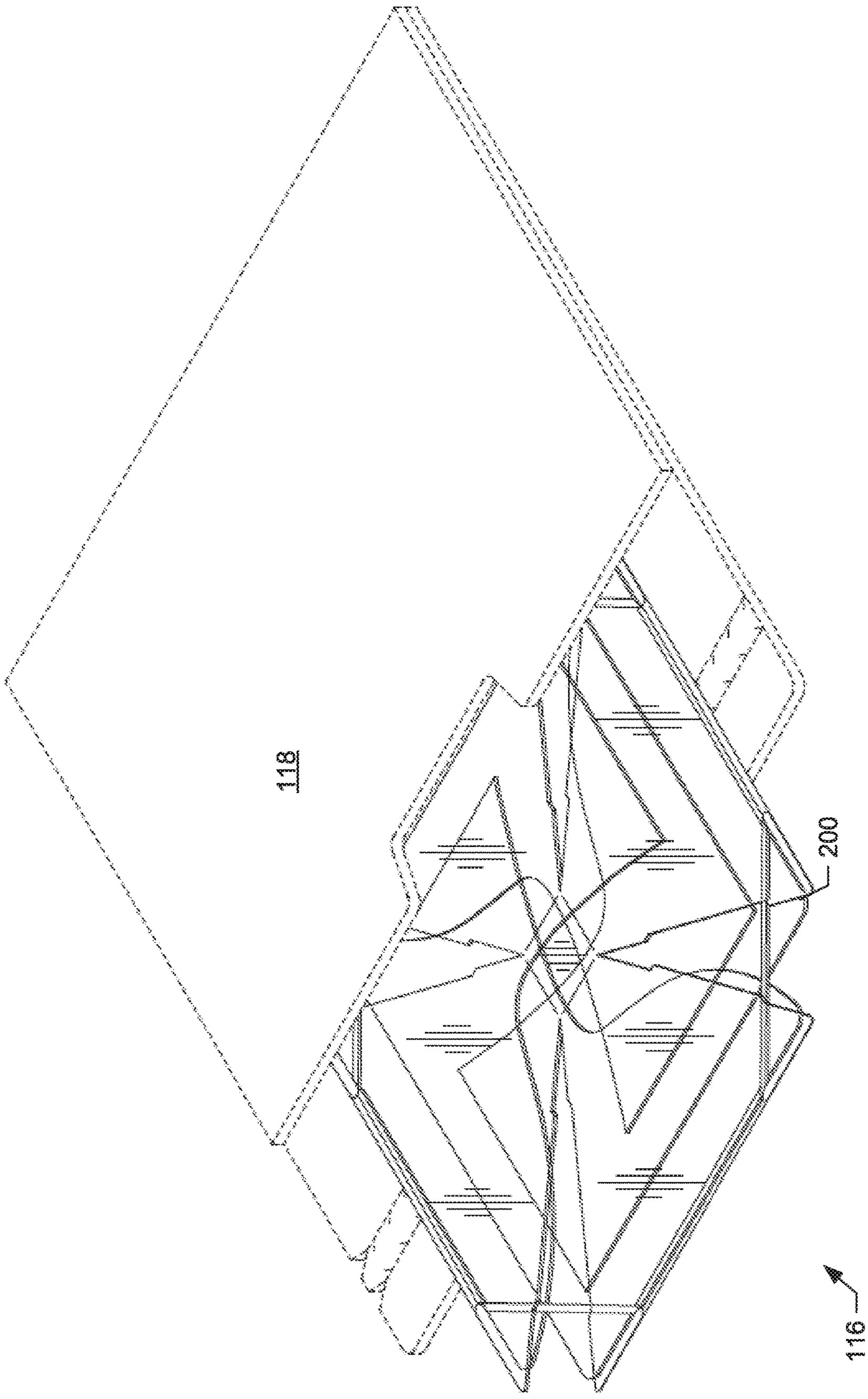

FIG. 6

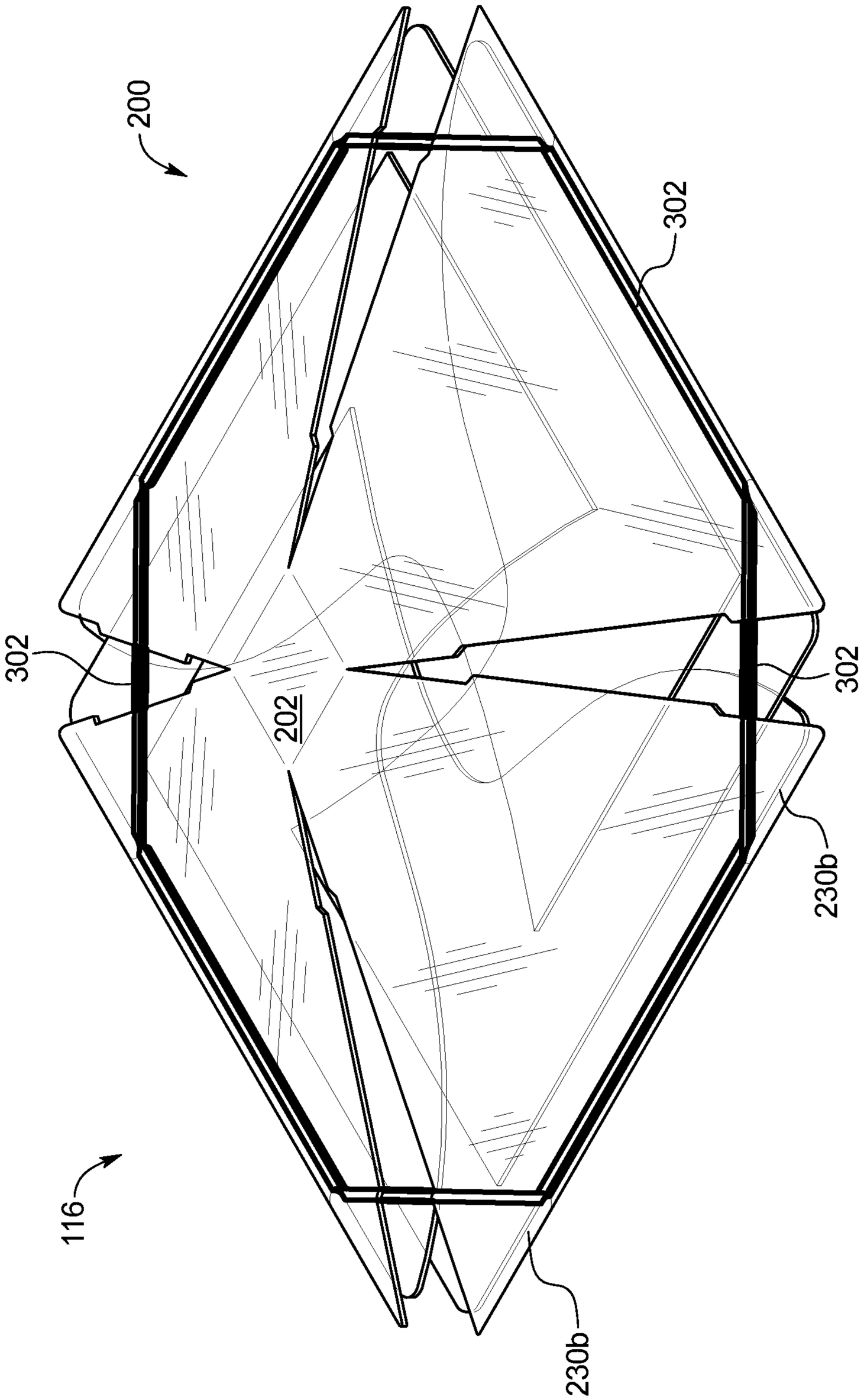

FIG. 7

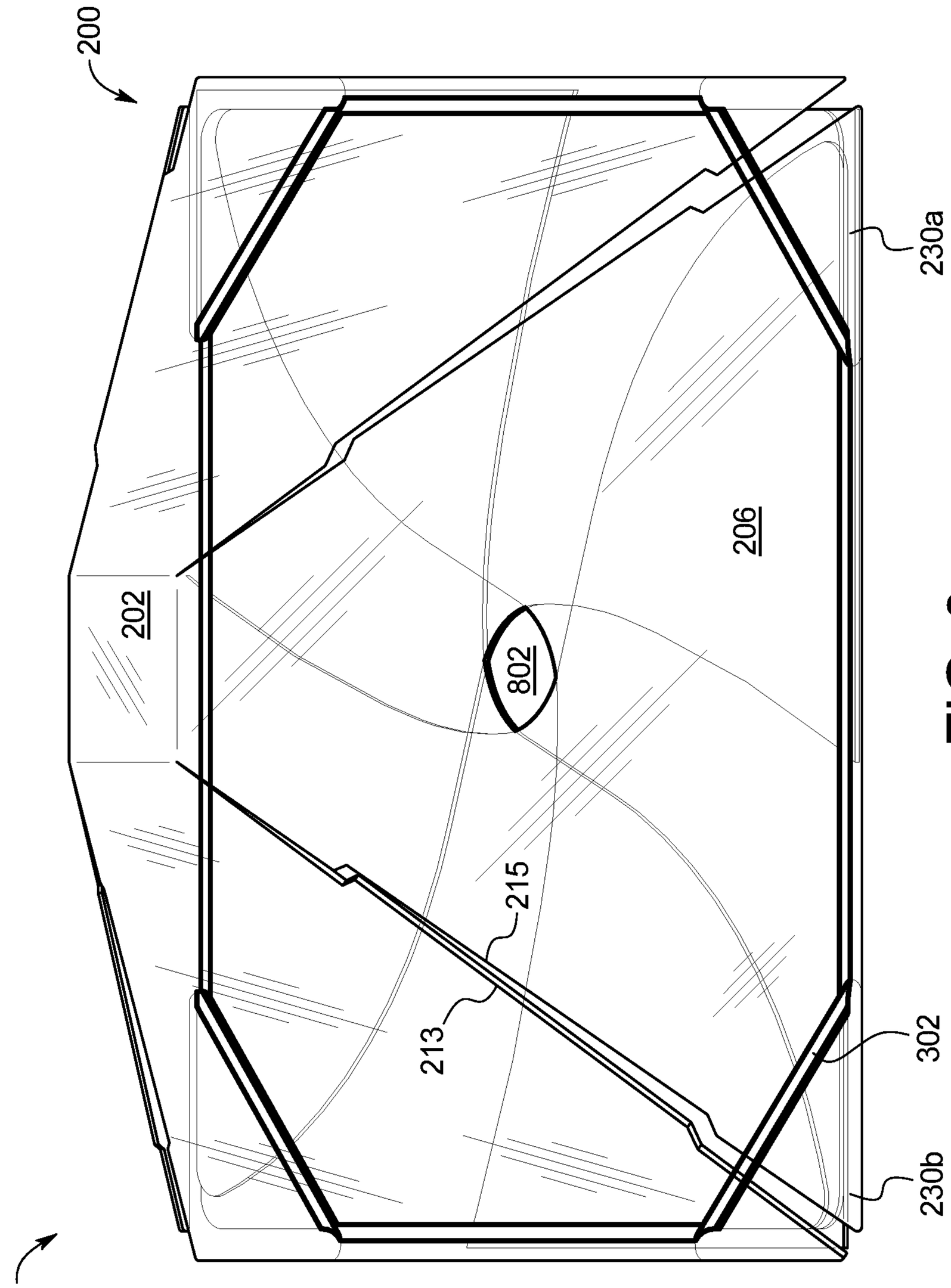

FIG. 8

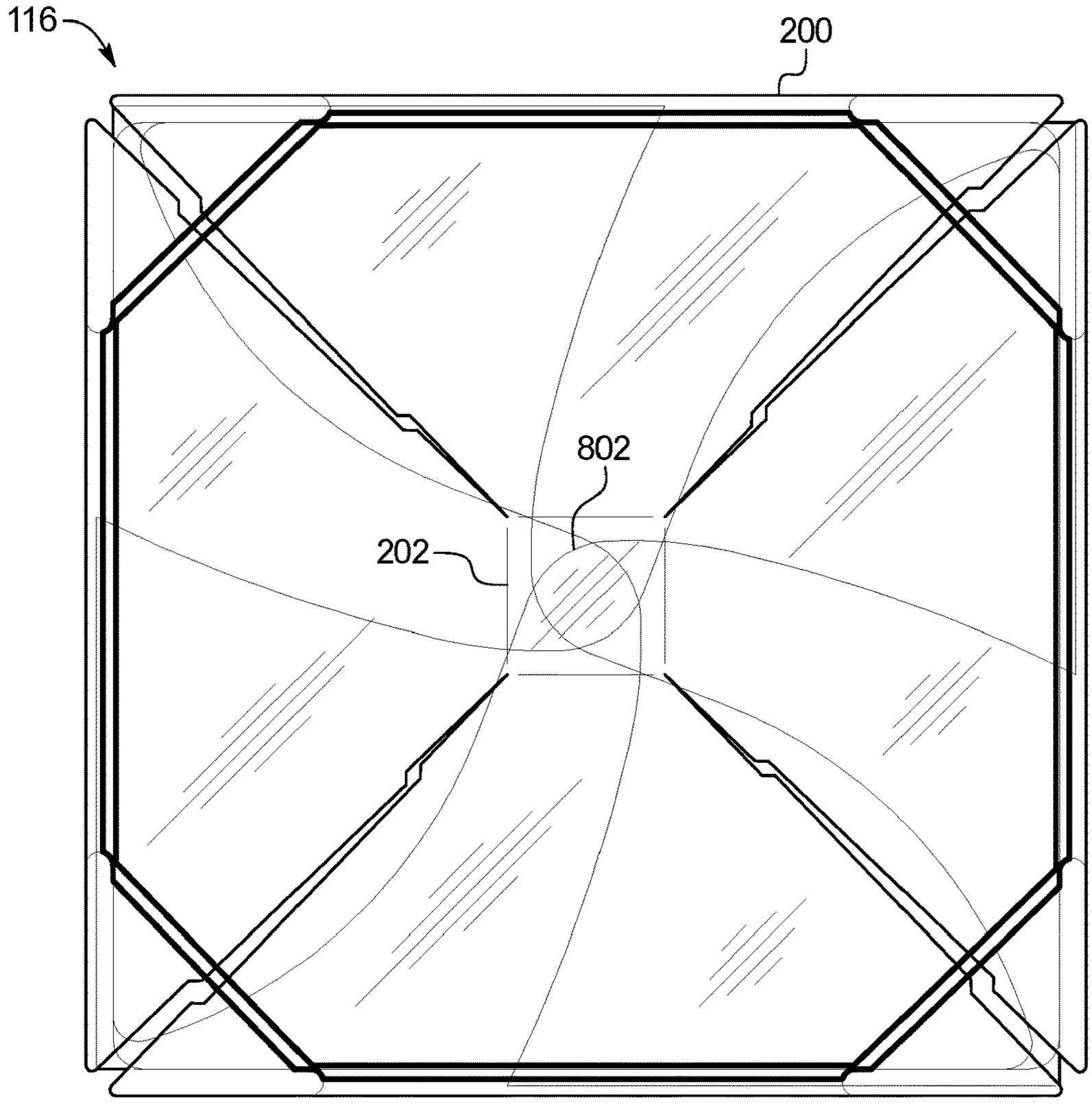

FIG. 9

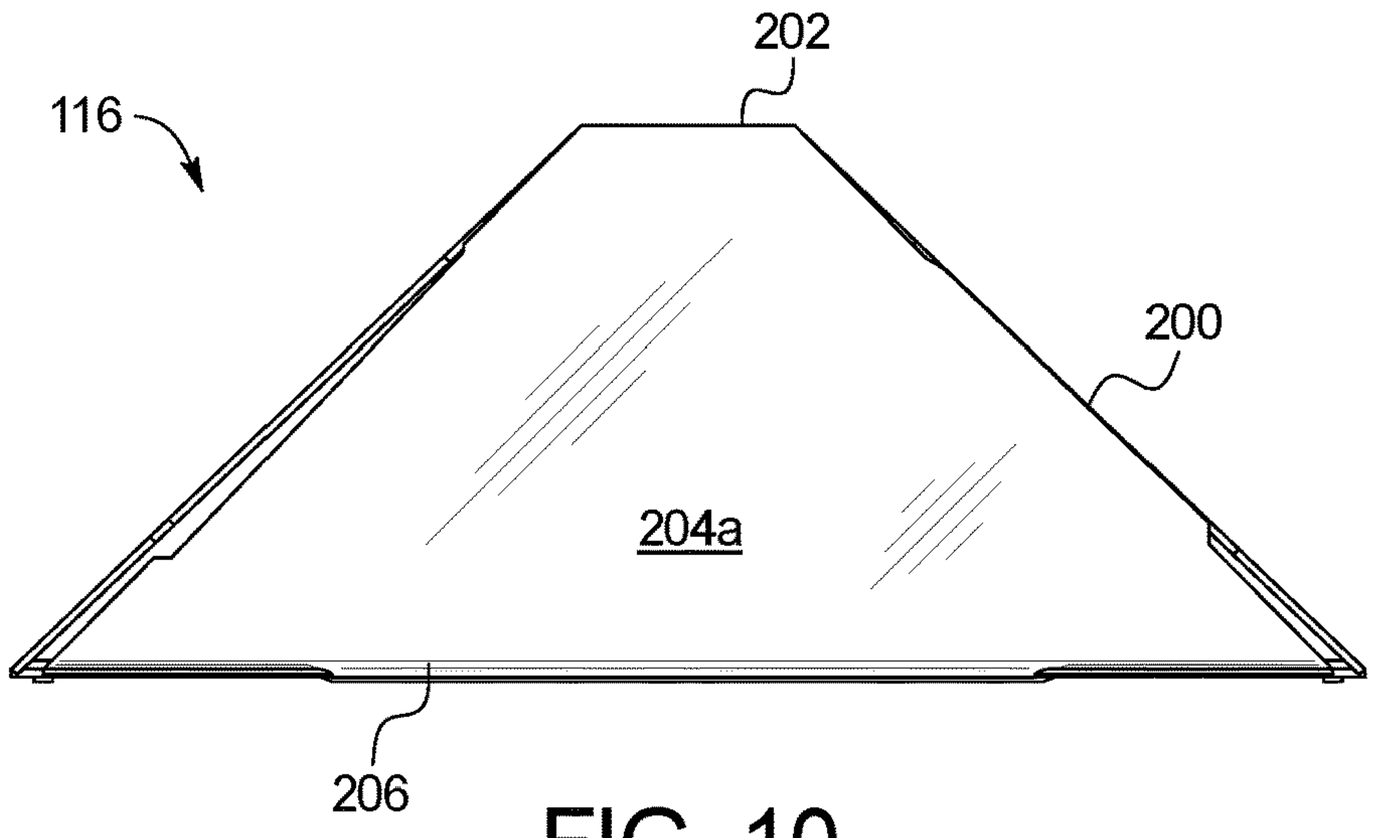

FIG. 10

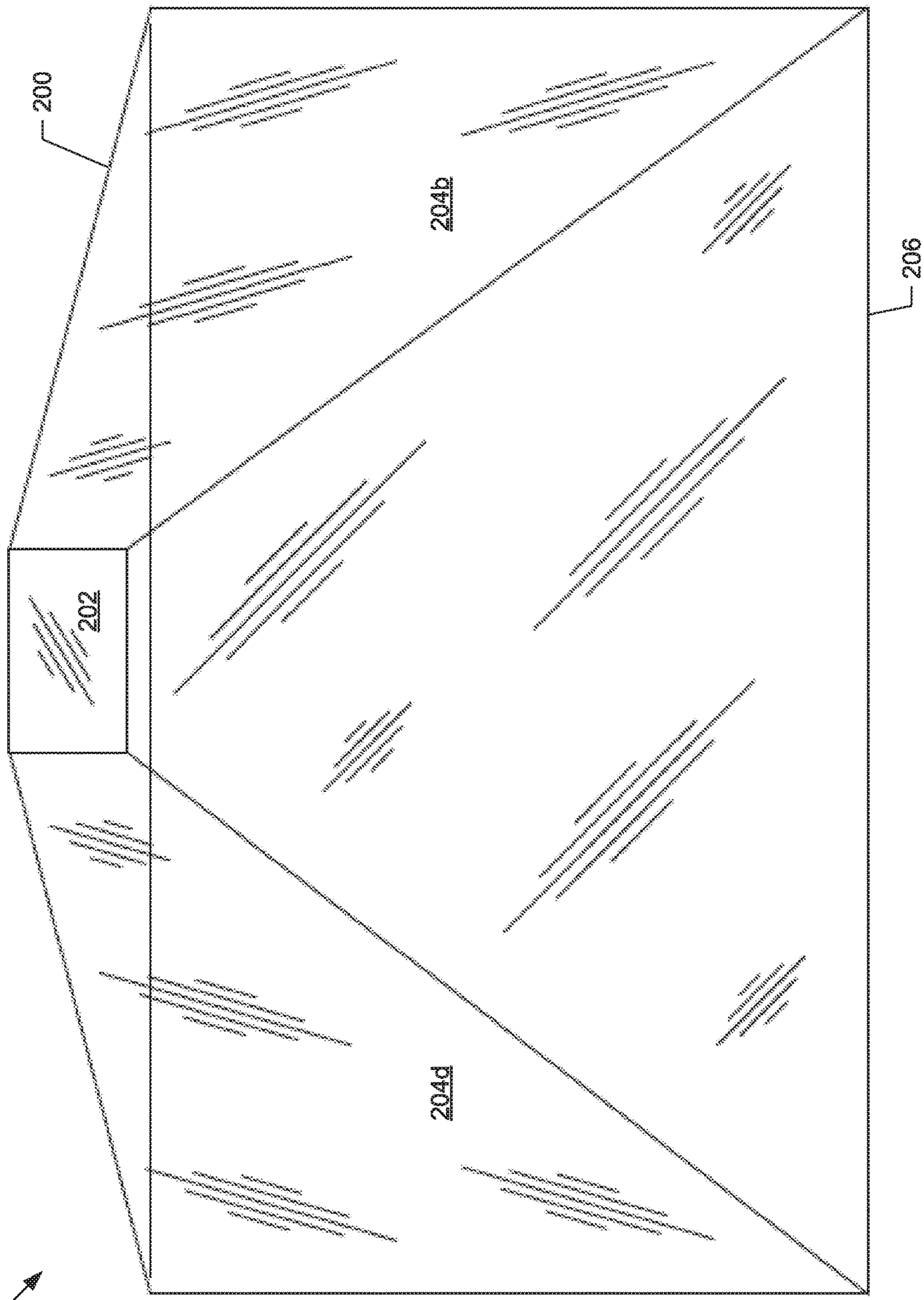

FIG. 11

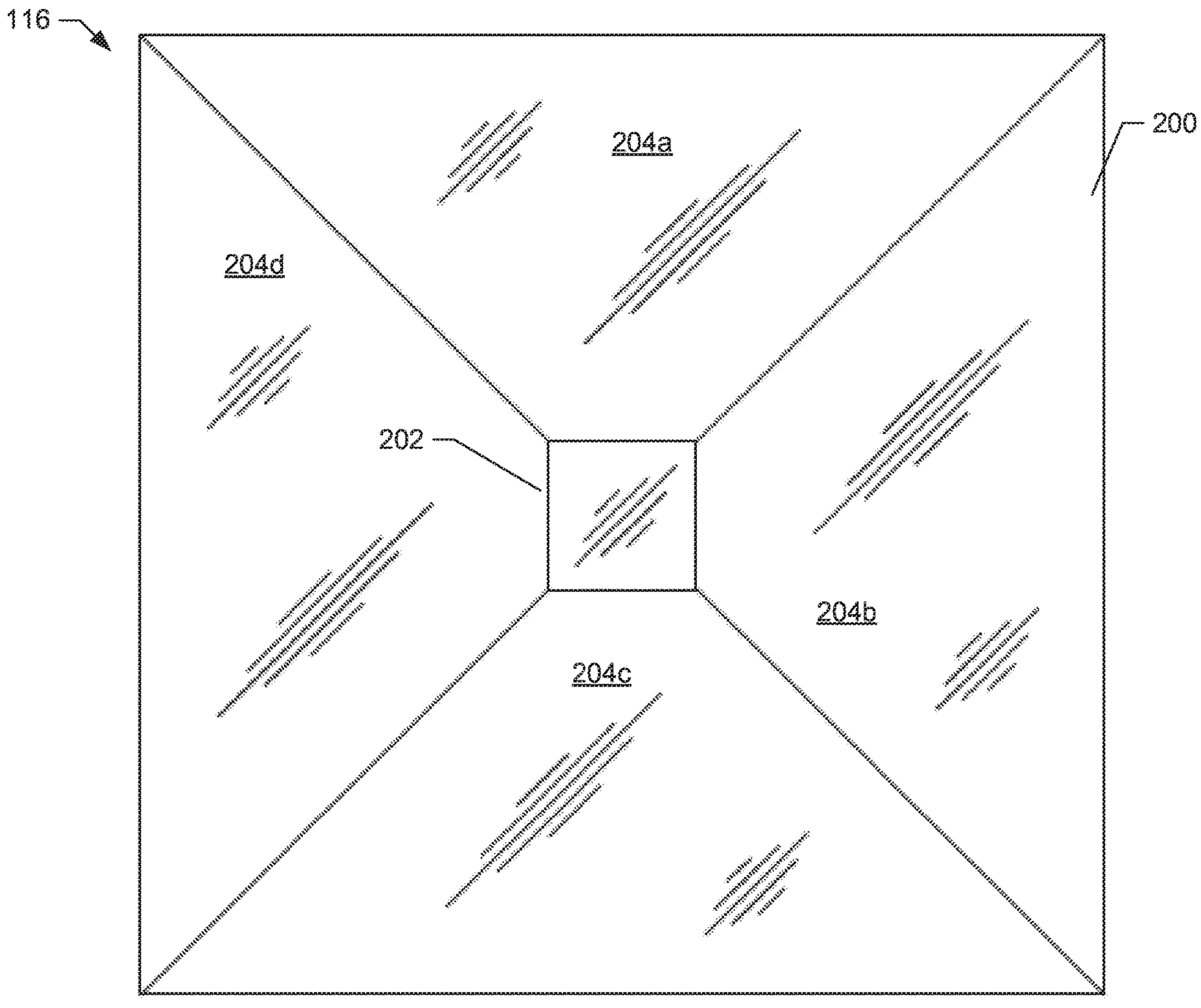

FIG. 12

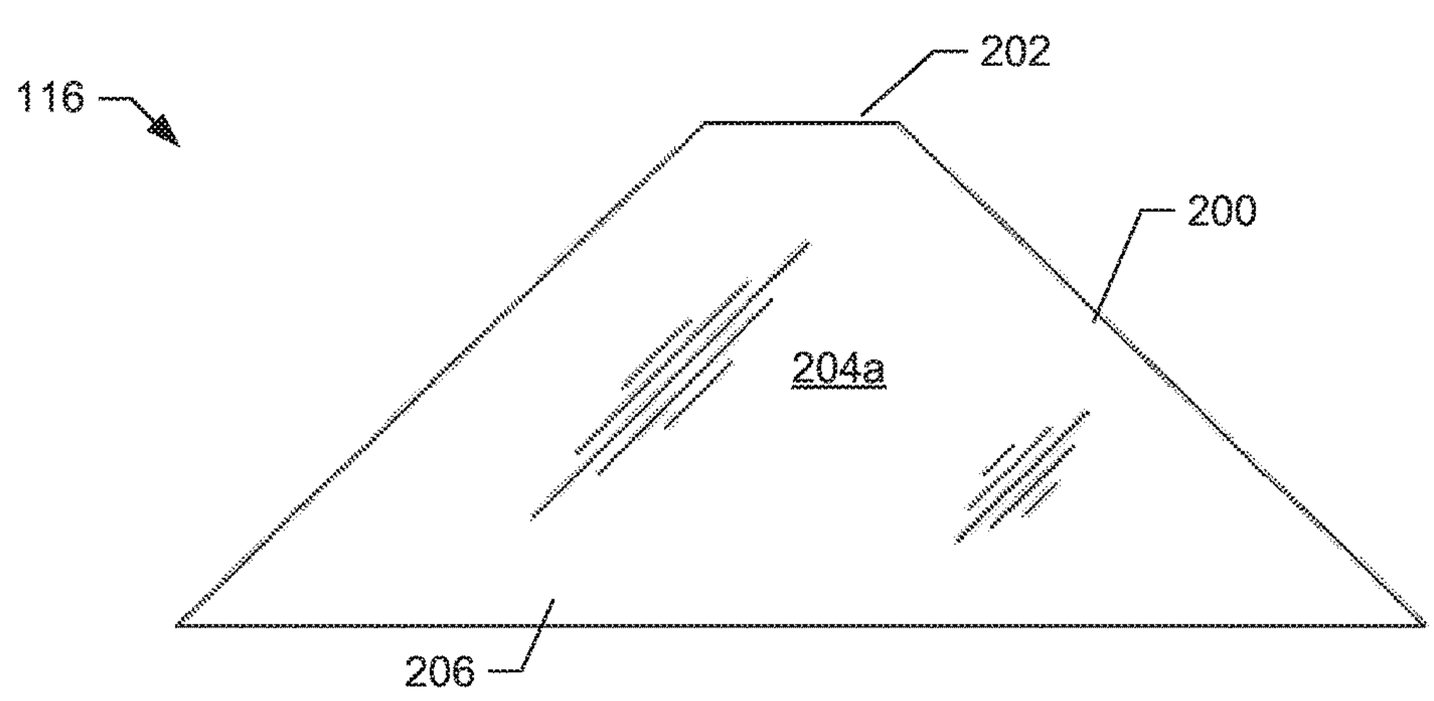

FIG. 13

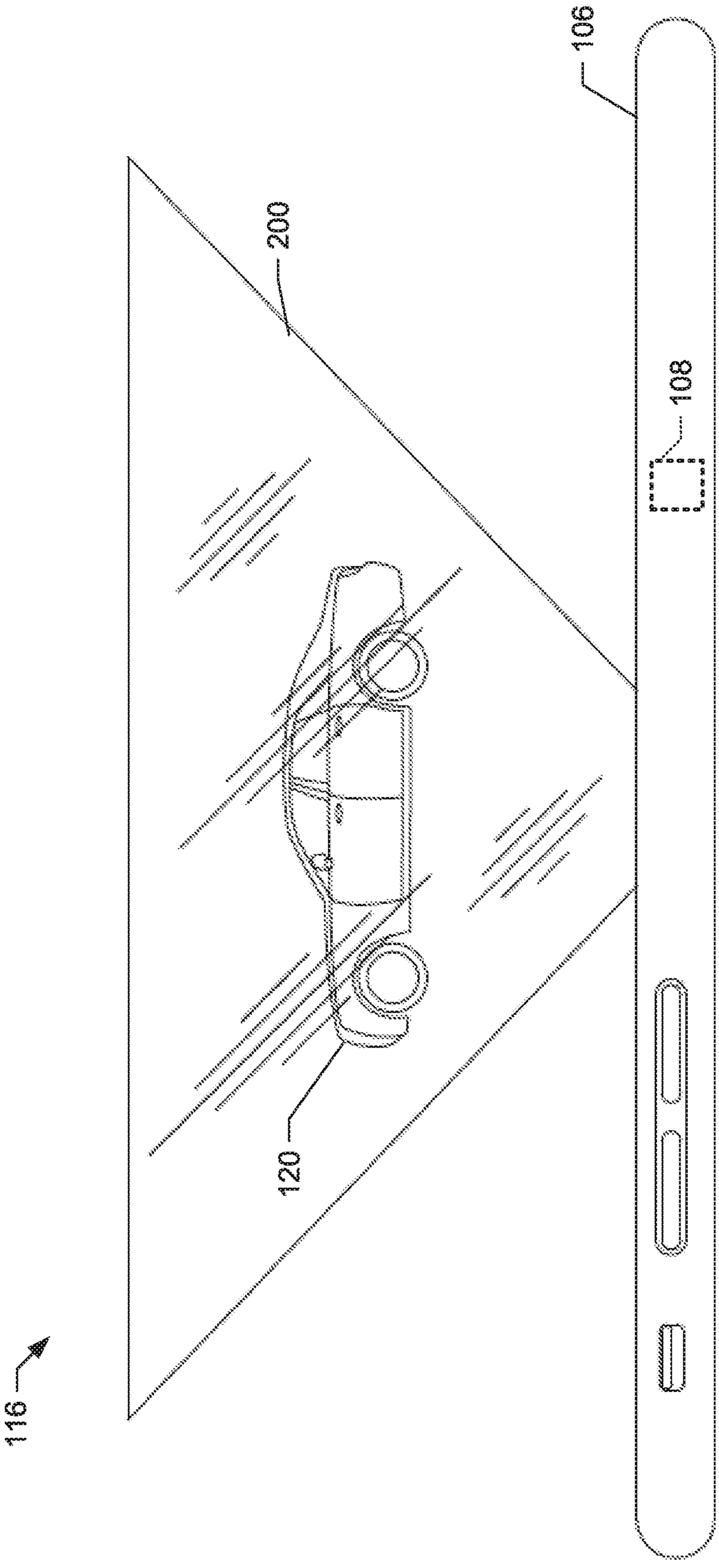

FIG. 14

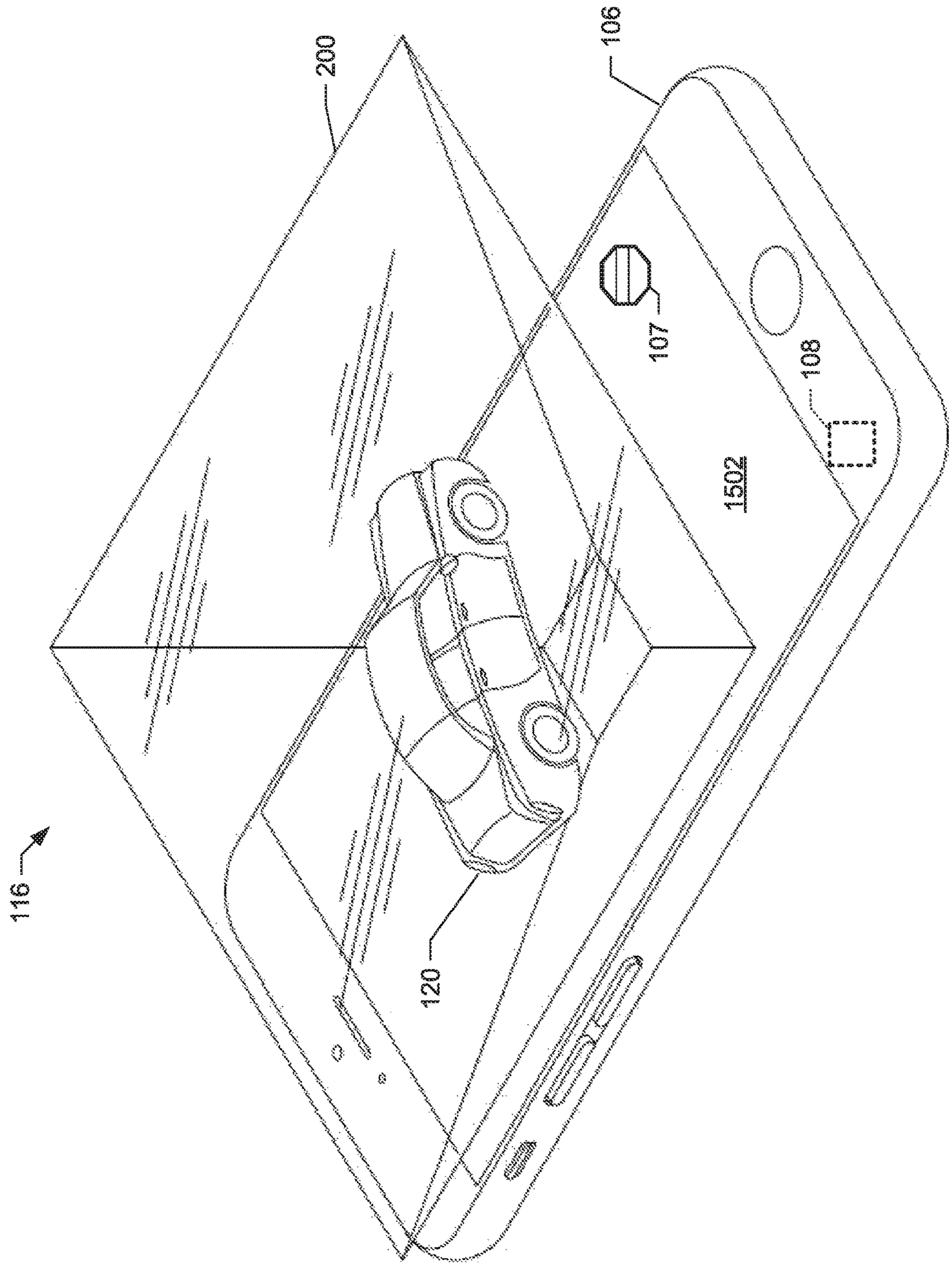

FIG. 15

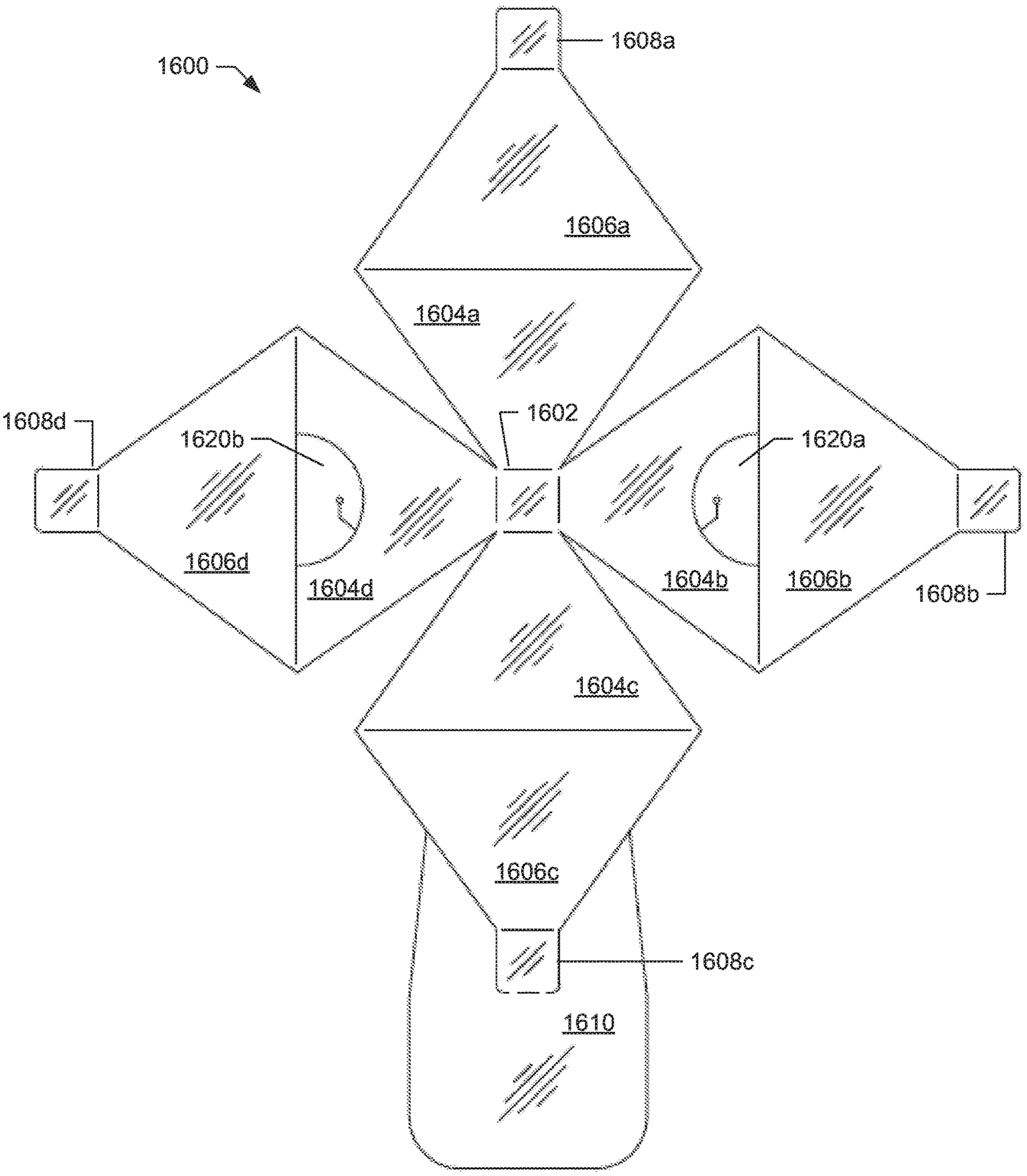
1600
1608a
1606a
1604a
1602
1608d
1620b
1620a
1606d
1604d
1604b
1606b
1608b
1604c
1606c
1608c
1610

FIG. 16

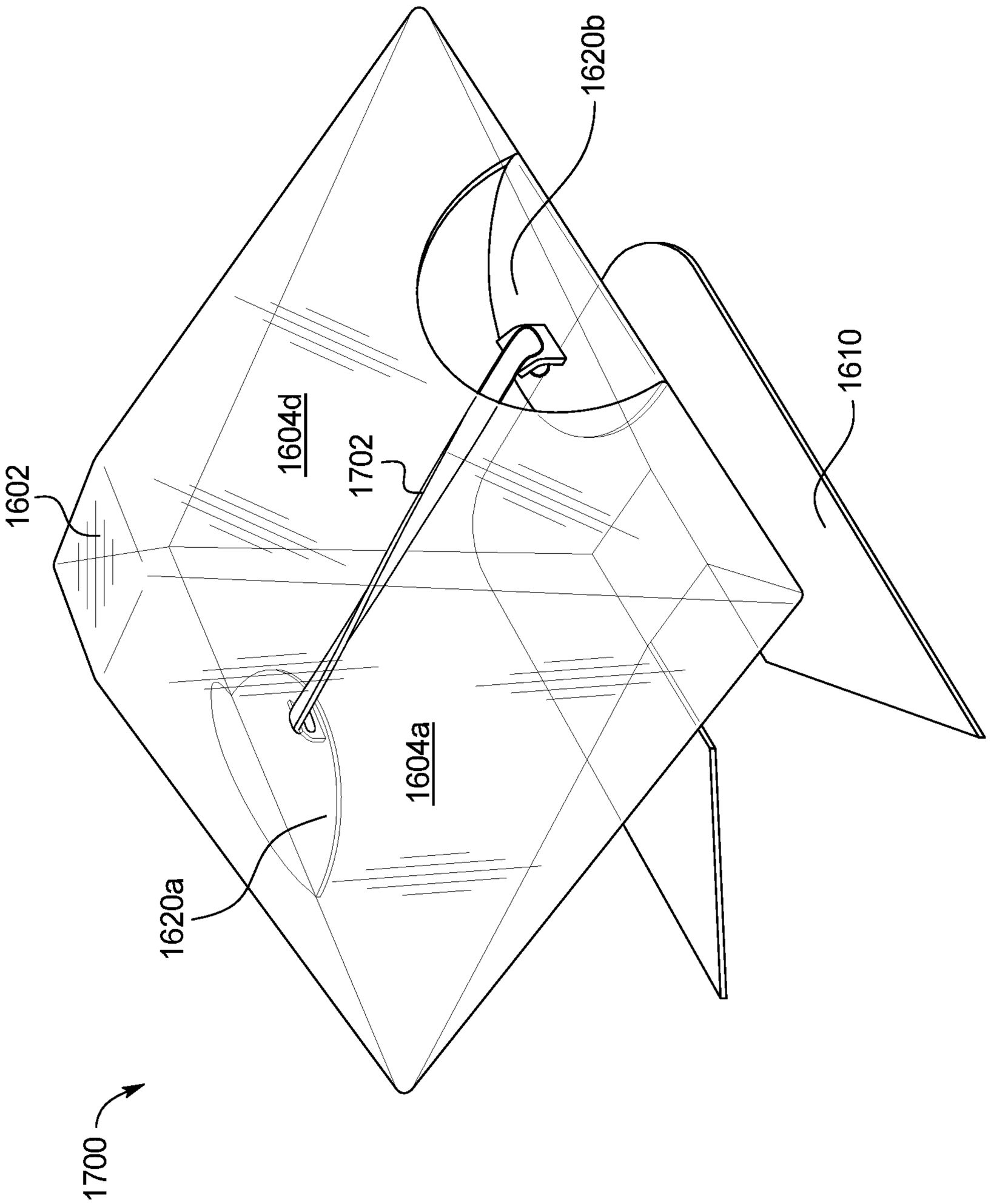

FIG. 17

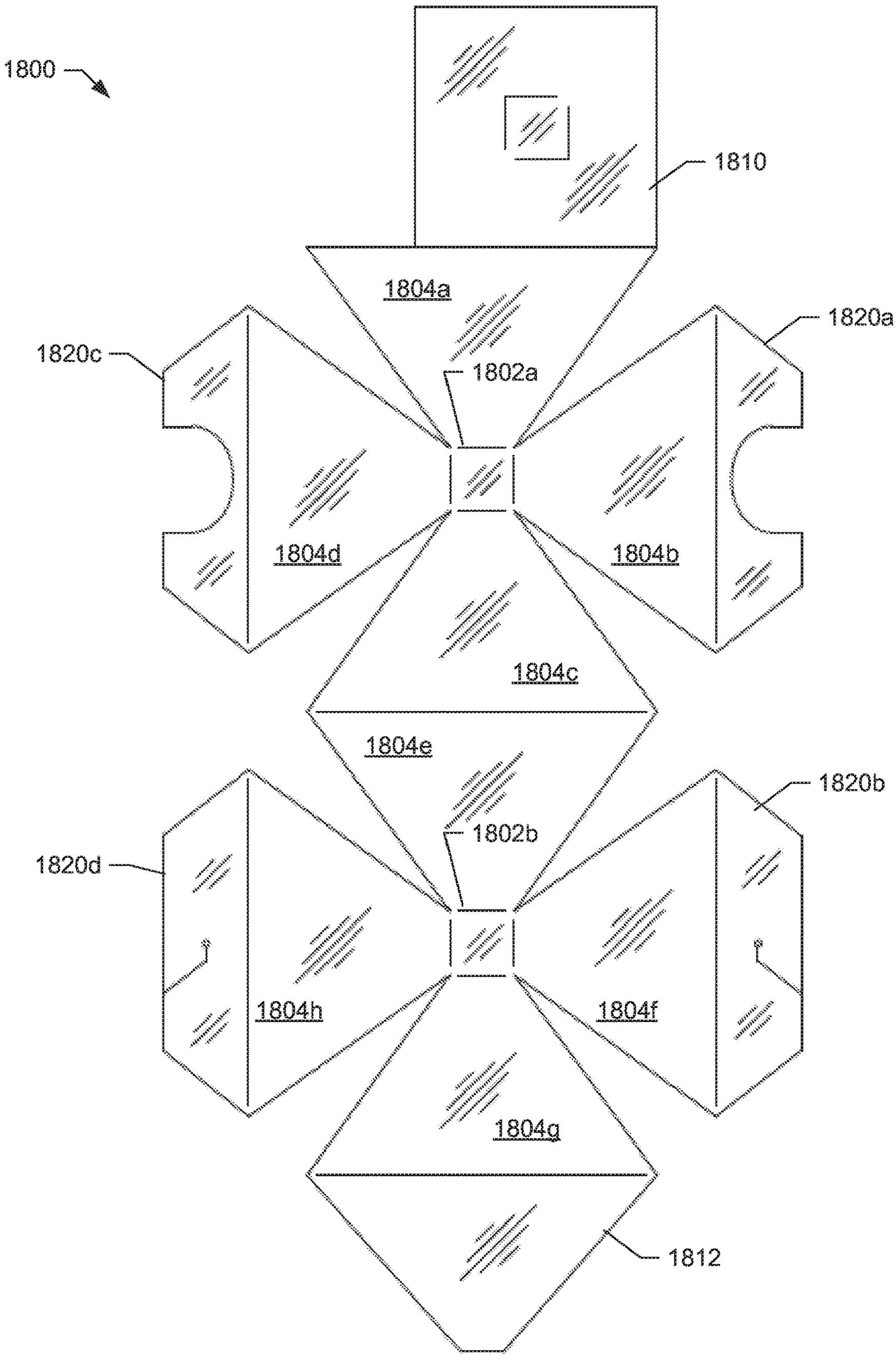
1800
1810
1804a
1820a
1820c
1802a
1804d
1804b
1804c
1804e
1820b
1820d
1802b
1804h
1804f
1804g
1812

FIG. 18

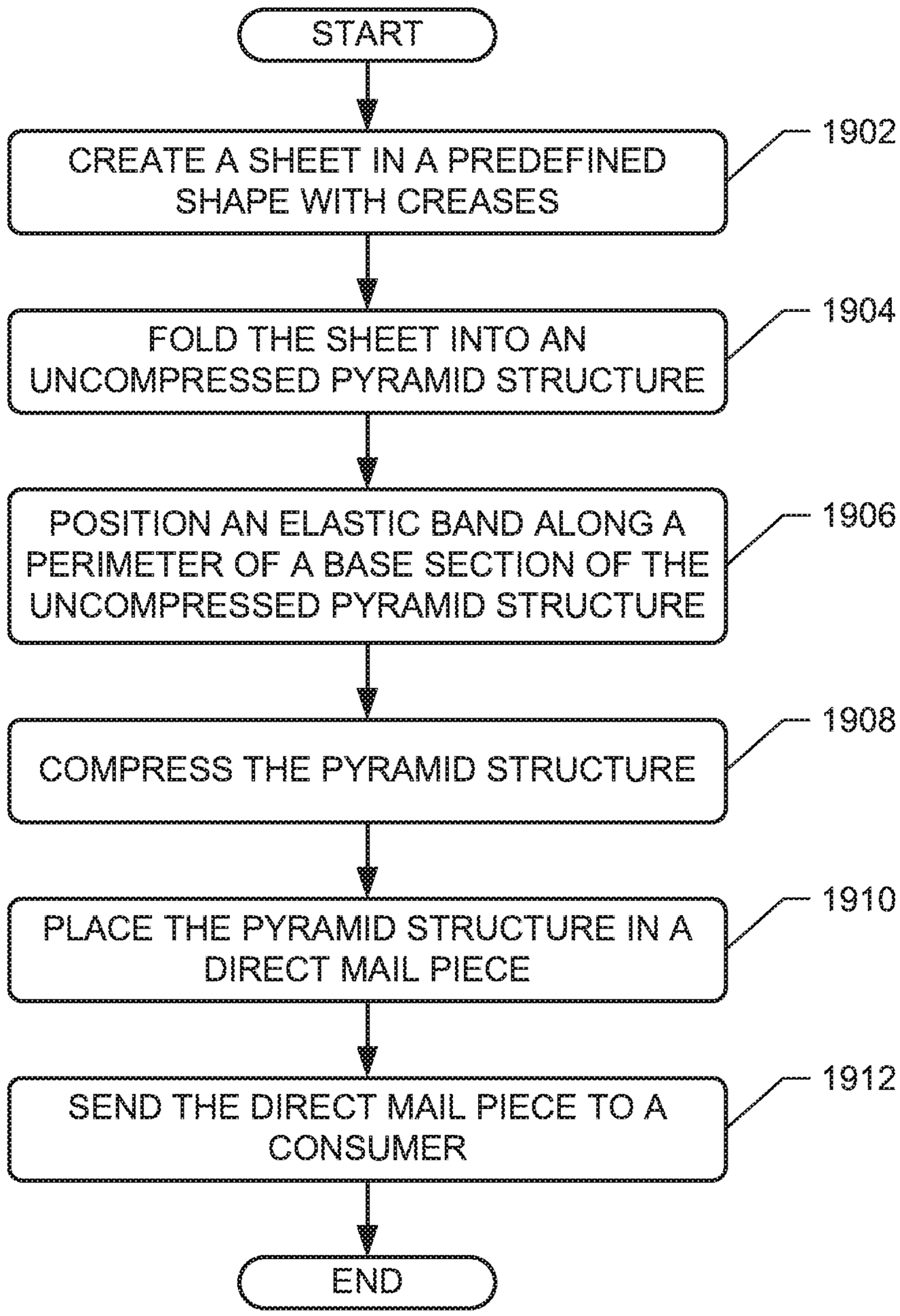
START
CREATE A SHEET IN A PREDEFINED SHAPE WITH CREASES
1902
FOLD THE SHEET INTO AN UNCOMPRESSED PYRAMID STRUCTURE
1904
POSITION AN ELASTIC BAND ALONG A PERIMETER OF A BASE SECTION OF THE UNCOMPRESSED PYRAMID STRUCTURE
1906
COMPRESS THE PYRAMID STRUCTURE
1908
PLACE THE PYRAMID STRUCTURE IN A DIRECT MAIL PIECE
1910
SEND THE DIRECT MAIL PIECE TO A CONSUMER
1912
END

FIG. 19

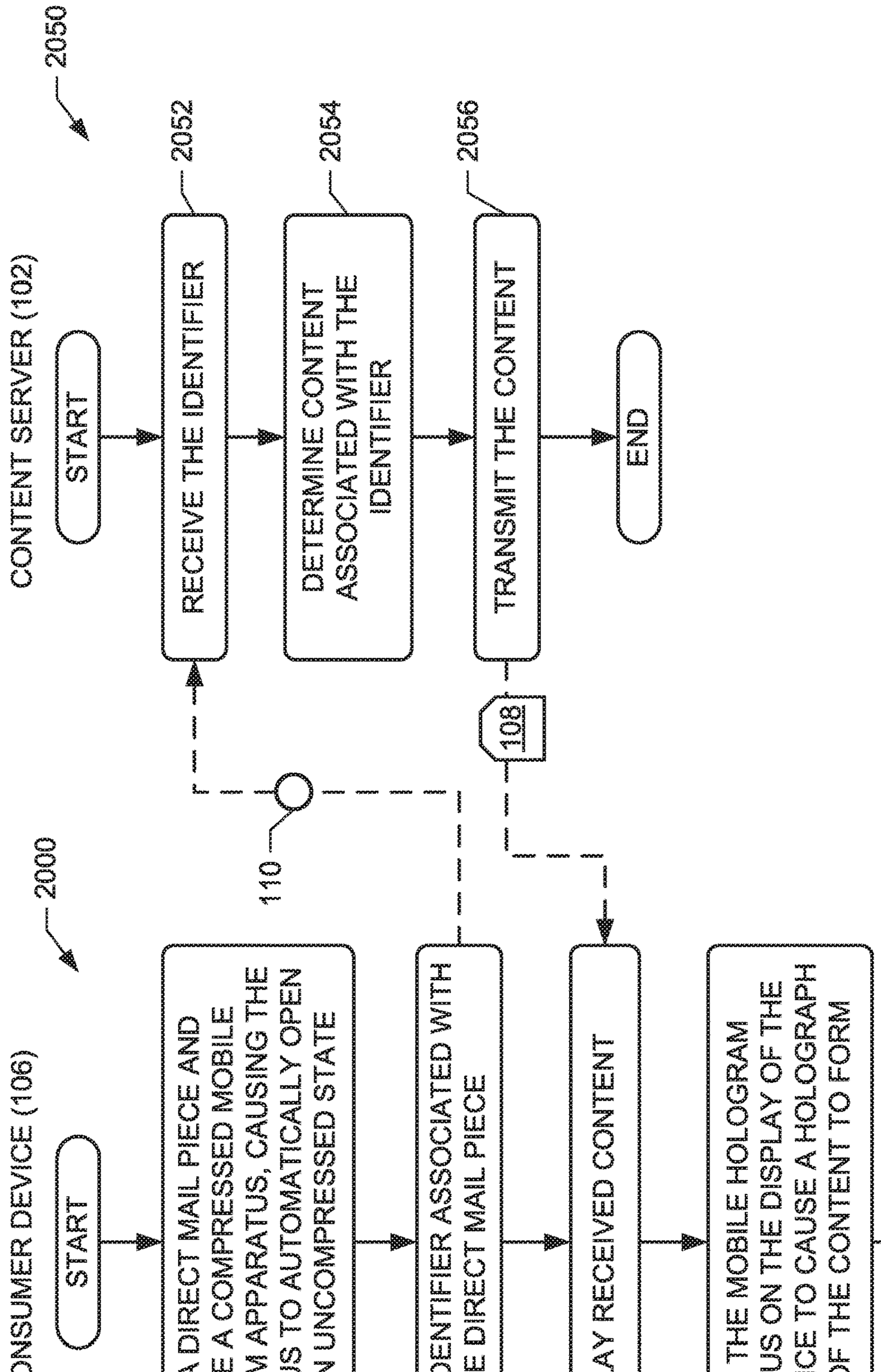
2050
CONTENT SERVER (102)
START
RECEIVE THE IDENTIFIER
2052
DETERMINE CONTENT ASSOCIATED WITH THE IDENTIFIER
2054
TRANSMIT THE CONTENT
2056
END
2000
CONSUMER DEVICE (106)
START
2002
OPEN A DIRECT MAIL PIECE AND REMOVE A COMPRESSED MOBILE HOLOGRAM APPARATUS, CAUSING THE APPARATUS TO AUTOMATICALLY OPEN INTO AN UNCOMPRESSED STATE
2004
SCAN AN IDENTIFIER ASSOCIATED WITH THE DIRECT MAIL PIECE
2006
DISPLAY RECEIVED CONTENT
2008
PLACE THE MOBILE HOLOGRAM APPARATUS ON THE DISPLAY OF THE USER DEVICE TO CAUSE A HOLOGRAPH IMAGE OF THE CONTENT TO FORM
END
110
108

FIG. 20

MOBILE HOLOGRAM APPARATUS

PRIORITY CLAIM

The present application is a continuation of, claims priority to and the benefit of U.S. patent application Ser. No. 15/247,457, filed on Aug. 25, 2016, which claims priority to and the benefit of U.S. Design patent application No. 29/569,369, now U.S. Pat. No. D858,614, filed on Jun. 27, 2016, the entirety of which are incorporated herein by reference.

BACKGROUND

It is estimated that companies spend approximately $160 billion on all direct and digital marketing. Despite trends towards digital marketing, direct mail still accounts for about $48 billion in spending. Surprisingly, marketers have found that direct mail has a better response rate compared to email. For instance, consumers sometimes experience 'digital-overload' and prefer, at times, reading printed material, even direct mail marketing. The physical look and feel of print marketing offers a break from the bombardment of emails and webpages. However, direct mail materials often cost 100 times more than comparable digital marketing through email. The substantial costs arise from purchasing base materials, printing, and mailing. This significant difference in cost oftentimes reduces the return on the marketing investment in direct mail.

As one can appreciate, the significant costs usually limit direct mail to advertisements for local services and high-value products. A search through a junk-mail pile in any residence yields advertisements for local services including landscaping, painting, housekeeping, real estate services, and day cares. In addition, there are advertisements for high-value products including cars, vacations, real estate, cable/satellite television service, phone service, furniture, and custom/bespoke clothing. To improve the return on investment, marketers are continuously searching for direct mail pieces that standout and improve engagement and response rates, thereby improving the return on investment. For instance, some marketers send direct mail materials that include limited-functionality cell phones that automatically place a call to a service center and display content upon being opened. Other marketers have begun to integrate direct mail pieces with online content. As long as billions of dollars are being spent on direct mail, marketers will continue to create new types of direct mail marketing materials.

SUMMARY

The present disclosure provides a new and innovative mobile hologram apparatus for use in direct mail materials. The example mobile hologram apparatus is configured to self-actuate or open from a compressed state to an uncompressed state when removed from a direct mail piece. In an uncompressed state, the example mobile hologram apparatus has a pyramid-shape with a flat top (e.g., a frustum). The mobile hologram apparatus is made from translucent material, such as plastic, that enables a consumer to view a holographic image produced by internally reflected and/or interfered light. The flat top of the example mobile hologram apparatus is configured to be placed on a display screen of a consumer device. Light, arranged in a predefined pattern, propagates through the flat top (or angled side sections) and reflects off the side sections of the pyramid. The reflected light interferes within a middle of the pyramid to produce a desired holographic image. The use of the mobile hologram apparatus with a network-enabled consumer device facilitates the transmission of content from one or more servers for display within the example apparatus as a holographic image, video, or animation.

In an example embodiment, a mobile hologram apparatus includes a sheet folded along preformed creases into a pyramid structure configured to be actuated between a compressed state and an uncompressed state. The example pyramid structure has a base section and a top section connected by four side sections. The compressed pyramid structure has a height that is less than 1/10th the height of the uncompressed pyramid structure. The example apparatus also includes an elastic band connected to a perimeter of the base section of the pyramid structure and configured to cause the pyramid structure to self-actuate from the compressed state to the uncompressed state.

In another embodiment, a mobile hologram apparatus includes a sheet folded along preformed creases into a pyramid structure configured to be actuated between a compressed state and an uncompressed state. The example pyramid structure has a base section and a top section connected by side sections. The compressed pyramid structure has a height that is less than the height of the uncompressed pyramid structure, and a larger base section than a size of the base section of the uncompressed pyramid structure. The example apparatus also includes an elastic band connected to the base of the pyramid structure and configured to cause the pyramid structure to actuate from the compressed state to the uncompressed state. The apparatus further includes a direct mail envelope dimensioned to accommodate at least the pyramid structure in the compressed state.

In yet another embodiment, a mobile hologram sheet apparatus includes a square-shaped top section located within a middle of the transparent sheet apparatus and four triangular-shaped side sections each having a bottom edge and a top edge. Each of the side sections is connected at the top edge to the top section. The four side sections are 90 degrees apart from each other. The example sheet apparatus also includes four boot-shaped base arms each connected to the bottom edge of one of the side sections. The example sheet apparatus further includes a first four preformed creases located at respective junctions between each of the top edges of the four side sections and the top section, and a second four preformed creases located at respective junctions between each of the side sections and the respective base arms.

Additional features and advantages of the disclosed system, method, and apparatus are described in, and will be apparent from, the following Detailed Description and the Figures.

BRIEF DESCRIPTION OF THE FIGURES

FIG. **1** shows a mobile hologram environment that includes at least one content server, at least one consumer device, and at least one mobile hologram apparatus, according to an example embodiment of the present disclosure.

FIG. **2** shows a diagram of a sheet used to form the mobile hologram apparatus of FIG. **1**, according to an example embodiment of the present disclosure.

FIGS. **3** to **6** show diagrams of the mobile hologram apparatus of FIGS. **1** and **2** in an assembled, compressed state, according to example embodiments of the present disclosure.

FIG. **7** shows a diagram of the mobile hologram apparatus transitioning from the compressed state to an uncompressed state, according to an example embodiment of the present disclosure.

FIGS. **8** to **13** show the mobile hologram apparatus of FIGS. **1** and **2** in the uncompressed state, according to example embodiments of the present disclosure.

FIGS. **14** and **15** show diagrams of the example mobile hologram apparatus of FIG. **1** in an uncompressed state placed atop a consumer device displaying a holographic image, according to example embodiments of the present disclosure.

FIGS. **16** to **18** show diagrams of alternative sheets that may be used to create mobile hologram apparatuses, according to example embodiments of the present disclosure.

FIG. **19** illustrates a flow diagram showing an example procedure to create the mobile hologram apparatus of FIGS. **1** to **15**, according to an example embodiment of the present disclosure.

FIG. **20** illustrates a flow diagram showing example procedures to display content using the mobile hologram apparatus of FIGS. **1** to **15**, according to example embodiments of the present disclosure.

DETAILED DESCRIPTION

The present disclosure relates in general to a mobile hologram apparatus or more generally, a hologram projector for use in direct mail. The example mobile hologram apparatus is configured to self-actuate or self-assemble from a compressed state to an uncompressed state when removed from a direct mail piece. In the uncompressed state, the example mobile hologram apparatus has a pyramid-shape with a flat top section, a flat base section, and at least three sides sections (e.g., a frustum). The flat top is configured to be placed on a display screen of a consumer device such that the pyramid-shape is upside down. Preconfigured light beams propagate from the display screen and though the top section and/or side sections of the mobile hologram apparatus. The light reflects off of the side and base sections to intersect within a center of the pyramid-shape. An interference pattern is formed at the point the light intersects to produce a holographic image. The preconfigured light beams may be varied over time to give the appearance that the object shown in the holographic image is rotating or moving. In some instances, the light beams may be varied overtime to cause a holographic video to be displayed.

There are known do-it-yourself hologram devices available. For instance, websites illustrate how a hologram apparatus can be constructed from compact-disc cases or other known plastic components. Generally, a user has to cut the pyramid sides and base from the material. The user than has to glue or tape the sides and base together to from the hologram apparatus. A known issue with these devices is that they are static. Known hologram devices cannot be compressed and uncompressed, which make their use in direct mail materials undesirable.

Some known marketers have attempted to mail unassembled pieces of a hologram device and provide instructions how the pieces are to be glued or taped together. For instance, a known device is mailed in a plastic sheet. A user is instructed to remove the individual side and base sections from the sheet, and then glue or tape the pieces together. A significant drawback of this known device is that consumers go through direct mail very quickly and cannot be bothered with the time consuming task of assembling a hologram device using glue and tape.

The example mobile hologram apparatus disclosed herein overcomes at least some of the above-mentioned issues of known hologram devices by being configured to immediately self-actuate from a compressed state, which is conducive to mailing, to an uncompressed state upon being removed from the direct mail piece. Almost no interaction is required from a consumer other than removing the compressed mobile hologram apparatus. The self-assembly nature of the mobile hologram apparatus encourages consumers to view content associated with the direct mail piece, and hopefully, purchase the related product or service. The disclosure provided herein describes non-limiting examples of mobile hologram apparatuses that are configured to self-assemble.

Throughout the disclosure, reference is made to a hologram or holographic image. As disclosed herein, a hologram or holographic image includes an interference pattern of light formed by pre-specified light beams reflecting off portions of side sections (and/or base section) of a pyramid-shaped mobile hologram apparatus. The hologram or holographic image may be two or three-dimensional. While blue light provides significant clarity, the hologram or holographic image may be displayed in any color or multiple colors. Further, the hologram or holographic image may include a static or dynamic image. For instance, an object displayed within the holographic image may be shown as rotating or moving in-place. In some instances, the hologram or holographic image may include a video.

Reference is also made herein to content for generating a hologram or holographic image. The content may include one or more files that define an image, moving image, and/or video to be displayed by a screen of a consumer device. The files specify how light beams are to be projected from the consumer device such that a reflected intersection of the beams within the mobile hologram apparatus produce a holographic image. The holographic image is generally not viewable on the display screen itself. The content may include, for example, an image of a product, a company trademark, or any other displayable object. As mentioned above, the content may provide a static holographic image or a dynamic image that appears to move or change.

Further, while reference is made to placing the example mobile hologram apparatus on a display screen of a consumer device, it should be appreciated that the mobile hologram apparatus may be used in many different environments and/or use cases. For example, the mobile hologram apparatus may be placed on a television or computer monitor screen. In other examples, the example mobile hologram apparatus may be used in retail environments for product and/or service displays. Further, the mobile hologram apparatus may be used in entertainment, such as 4D theaters or rides that utilize audience interaction.

Moreover, reference is made herein to using the mobile hologram apparatus within direct mail material, such as an envelope. It should be appreciated that the mobile hologram apparatus may also be provided within an insert of a magazine, catalogue, or brochure. The mobile hologram apparatus may also be included within newspapers or dispensed as promotional merchandise at conferences, trade shows, sporting events, fairs, etc. In some examples, the mobile hologram apparatus may be included within product packaging and/or instructions as a way to illustrate, in a tutorial for example, product features or assembly in a three-dimensional image.

Mobile Hologram Environment Embodiment

FIG. **1** shows a diagram of an example mobile hologram environment **100**, according to an example embodiment of

the present disclosure. The example environment **100** includes content servers **102**, a network **104**, and consumer devices **106**. The example content servers **102** are configured to provide content **108** to the consumer devices **106** responsive to receiving a message **110** including, for example, an identifier and/or link. As mentioned above, the content **108** may include file(s) or message(s) specifying one or more static images, movable images, animation, and/or video. The content **108** may also include file(s) or message(s) specifying a sequence of static images, moveable images, text, video, animation, and/or combinations thereof.

The example content servers **102** are configured to store the content within one or more store systems. The content may be created and/or generated at the content servers **102**. Additionally or alternative, the content **108** may be created at a third-party system **112** and transmitted to one of the content servers **102** for distribution. The content is indexed or otherwise correlated to an identifier. In other instances, content is located at separate addresses and/or links.

The example content servers **102** are configured to enable the content **108** associated with a particular identifier and/or location to be edited. For example, the content server **102***b* is instructed to store a first version of content **108***a*. At a later time, the content server **102***b* is instructed to store a second version of the content **108***a*. The second version may include more timely information or replace stale information. Such a configuration enables a marketer and/or company to change which content is provided to a consumer, even after a direct mail piece with the corresponding identifier and/or link is mailed.

The content servers **102** may be included within any processor, hardware, computer, storage system, workstation etc. Further the content servers **102** may be distributed within a cloud computing network. In some embodiments, the content servers **102** may operate using virtualized systems. For instance, the content servers **102** may provide application programmable interfaces ("API") that are configured to receive specifically formatted messages for particular content. The content servers **102** translate the request messages based on which third-party system is hosting the content, and operate as routers to transmit the requests for content to an appropriate third-party system. The content servers **102** may then route the content received from the third-party system to the consumer device **102**, providing the appearance (to the consumer device) that the content server **102** provided the content.

In some embodiments, the content servers **102** may also receive feedback regarding a consumer's interaction with the content. Such information may include, for example, a duration the consumer viewed the content, a number of times the content was replayed, a date/time the content was played, and/or an indication whether a user interacted with the content. Interaction with the content may include, for example, entering information into the consumer device **106** in response to a prompt from the content. Interaction with the content **108** may also include physical actions to move and/or rotate a holographic image displayed by the content **108** (as detected by one more sensors on the consumer device **106**), and/or causing the consumer device **106** to navigate to a website or other web-based destination that is related to and/or specified by the content **108**. For example, after viewing content **108**, the consumer device **106** may transmit a request **114** (per an instruction from a consumer) to the third-party system **112** to view more information or to purchase a product and/or service advertised by the content **108**. In some instances, the request **114** may be sent to another entity separate from the third-party system **112** and/or the content server **102***c* that provided the content **108***b*. For instance, the third-party system **112** may include a digital marketing company tasked with creating content that advertises a product sold by another company. A response to the content **108** may be sent to a website of the other company and/or a distributor of the other company.

The example network **104** (e.g., the Internet) may include any type of wireless and/or wired network. The network **104** may also include any number of routers and/or switches for transmitting requests for content and/or requests for content between the content servers **102** and/or consumer devices **106**. The network **104** may include a cellular, wide area network ("WAN"), and/or local area network ("LAN").

The example mobile hologram environment **100** of FIG. **1** also includes the client devices **106** configured to receive content **108** and display light beams or images to cause the content **108** to be displayed as a hologram. The consumer devices **106** may comprise, for example, a smartphone, a tablet computer, a smartwatch, smart-eyewear, a laptop computer, a desktop computer, a workstation, a processor with a display screen, or a server with a display screen. The consumer device **106** may include a media player for rendering the light beams or images for display as a holographic image. In other examples, the consumer device **106** (e.g., the consumer device **106***a*) may include a custom application **107** (i.e., an app) configured to render and cause the device **106** to display light beams or images from a display screen. For instance, the application **107** may cause four images separated by 90 degrees to be displayed on a screen of the consumer device **106**. The interference of the four images within a four-sided hologram apparatus creates a three-dimensional holographic image. It should be appreciated that the number of images displayed on a screen (by the application **107**) of the device **106** should correspond to a number of sides of the example mobile hologram apparatus. The application **107** may also record a consumer's interaction with the holographic image and/or change the appearance of the holographic image based on input received by the consumer device **106** from the consumer.

The consumer device **106** is configured to operate in conjunction with one or more mobile hologram apparatuses **116**. In the illustrated example, the mobile hologram apparatus **116** is sent to the consumer within a direct mail piece **118**. The mobile hologram apparatus **116** is placed into a compressed state while in the direct mail piece **118**. In some embodiments, a consumer device **106** or other device with similar display functionality may also be included or placed within the direct mail piece **118**. For instance, a display screen having a memory preloaded with content may be included within the direct mail piece **118**. In the illustrated example of FIG. **1**, a consumer places the mobile hologram apparatus **116** on the display screen of the consumer device **106**, which is loaded with content **108**, to view a hologram. In other embodiments, the mobile hologram apparatus **116** may be integrated with a consumer device or other device that has display functionality.

Returning to FIG. **1**, after removal from the direct mail piece **118**, the mobile hologram apparatus **116** is configured to self-actuate or self-assemble from a compressed pyramid structure into an uncompressed pyramid structure. As provided in more detail below, an elastic band or tension mechanism is placed around a perimeter of a base section of the mobile hologram apparatus **116**. The placement of the elastic band around the base section causes the base to restrict when the mobile hologram apparatus **116** is removed from the direct mail piece **118**. Restriction of the base section causes side sections to be angled upward forming an

uncompressed pyramid structure. Further description of the composition of the mobile hologram apparatus **116** and the direct mail piece **118** is provided in more detail in conjunction with FIGS. **2** to **13** below.

The direct mail piece **118** shown in FIG. **1** may include a retraining mechanism configured to hold the mobile hologram apparatus **116** in the compressed state or flat configuration. The restraining mechanism may include an elastic band placed on an outside of the mobile hologram apparatus **116**, an adhesive sticker, or any other device adapted to retain the mobile hologram apparatus **116** in the compressed state. After the restraining mechanism is released or removed, the elastic band or tension mechanism is configured to pull the panels or sections **202**, **204**, **206**, **208** (shown in FIG. **2**) of the mobile hologram apparatus **116** into the uncompressed state or expanded configuration.

The example mobile hologram apparatus **116** is configured to be placed upside-down on top of a display screen of the consumer device **106**. For instance, mobile hologram apparatus **116***a* is placed on consumer device **106***a* and mobile hologram apparatus **116***b* is placed on consumer device **106***b*. It should be appreciated that the relative sizes of the mobile hologram apparatus **116** and consumer devices **106** may differ. The positioning of the mobile hologram apparatus **116** on the display screen enables light waves or beams to be projected into the mobile hologram apparatus **116**. The light beams reflect off the side and base sections and intersect and interfere with each other within an interior middle of the mobile hologram apparatus **116**. The intersection of the light causes a three-dimensional interference pattern to form, which is referred to herein as a hologram or holographic image. The example mobile hologram apparatus **116***b* of FIG. **1** is shown with a cylinder-shaped holographic image **120**.

To obtain the content **108** (e.g., file(s) specifying light waves, beams, or images to be projected from a display screen of a consumer device **106**) for displaying the holographic image **120**, the direct mail piece **118** and/or the mobile hologram apparatus **116** may include an identifier **122**. For instance, identifier **122***a* is included within or printed on an outside of the base section of the mobile hologram apparatus **116**. Additionally, the identifier **122***b* is included within or printed on the direct mail piece **118**. The identifiers **122** may include a bar code, QR code, or any other code that is readable by the consumer device **106**. In these examples, a consumer uses the consumer device **106** to scan the code, which includes a network address, website address, and/or content code that corresponds to a location of related content at one of the servers **102**. The consumer device **106** transmits message **110**, with the content code, to the specified network/website address. In other embodiments, the identifier **122** may include text specifying, for example, a webpage and/or content code. In these other embodiments, the consumer manually enters the website address and/or content code into a web browser. In some alternative embodiments, the identifier **122** may include a microchip that is programmed with a network/website addresses and/or content code. In these examples, the consumer device **106** may read the microchip using a NFC reader or RFID reader, which provides the address and content code for accessing the related content **108** within the content server **102**.

The example consumer device **106** is configured to receive the content **108** in one or more messages from the content server **102**. The content **108** may include an image file, such as a JPEG. EXIF, TIFF, GIF, BMP, PNG, etc. for displaying a static image. The content **108** may also include a sequence stream of image files to provide the appearance of an animation or moveable image. Alternatively, the content **108** may include a movie file, such as a MOV, WMV, MP3, MP4, MPEG, GPP, Flash, etc. for displaying a video or animation. The consumer device **106** is configured to select a media player that corresponds to the type of received file to display the specified image. The content **108** may also specify the display of alignment markers **124** that guide a user to where the mobile hologram apparatus **116** is to be placed on a display screen of the consumer device **106**. The alignment markers **124** may include, for example, a dashed box around a perimeter of the displayed image or a dashed box defining an interior perimeter of the displayed image.

In some embodiments, a web browser may be used by the consumer device **106** instead of a media player. For example, the identifier **122** may include a web address, which when scanned or input, causes a web browser on the consumer device **106** to navigate to a specified webpage that includes the content **108** and/or the alignment guides **124**. The content **108** may be rendered through the webpage, using one or more media plugins as needed. in yet other embodiments, the custom application **107** on the consumer device **106** may be configured to render and cause the content to be displayed. The application **107** may be transmitted to the consumer device **106** prior to the content being transmitted, but after the identifier **122** is scanned.

It should be appreciated that the image displayed by the consumer device **106** may appear unintelligible (or four images that are 90 degrees apart (for an apparatus with four side sections)) when viewed by a consumer without the mobile hologram apparatus **116**. The displayed image is configured to compensate for the size and/or angle of side sections of the mobile hologram apparatus **116** such that when the light related to the image is reflected, the holographic image **120** is formed. Accordingly, the content **108** provided to the consumer device **106** has to be preconfigured for the screen size of the consumer device **108** and/or the size and/or dimensions of the mobile hologram apparatus **116**.

In some embodiments, the identifier **122** may be programmed or otherwise include the content **108**. In these examples, the consumer device **106** does not need to access the content server **102**. In an example, a QR code may be programmed to include the content **108**, which when scanned by the consumer device **106**, provides enough information for displaying a static image. In another example, the content **108** is included within a memory of the identifier **122**. Scanning of the memory causes the consumer device **106** to receive the content **108** and display a holographic image, video, animation, etc.

In addition to playing an image, the content **108** may also specify sounds to be played and/or instructions for activating a vibrator on the consumer device **106**. The audio may be coordinated with the display of the holographic image **120** (or video) to enhance the advertisement or marketing. The vibrator function may also be used to add another sensory feature to the marketing communication (and be coordinated with the display).

In some embodiments, the consumer device **106** is configured to process feedback from a consumer during and/or after viewing the holographic image **120**. For example, the consumer device **106** may enable a consumer to enter a specific web address into a web browser to navigate to a webpage to view more information and/or purchase a product and/or service. In other examples, the media player may display a website link or other related information on a display of the consumer device **106**. This displayed infor-

mation is meant to be read from the display and not the mobile hologram apparatus **116**. A consumer may view the information and/or select the link to navigate to a webpage to view more information. In yet other examples, the content **108** may include instructions causing the consumer device **106** to automatically navigate to a specified webpage after the presentation of the holographic image **120**. Such a configuration combines the engagement of the holographic image **120** with an increased potential for a consumer purchase.

In some examples, the consumer device **106**, using for example the custom application **107** or through website code, may track how a consumer interacts with the holographic image **120**. As mentioned above, this may include tracking how long the image **120** was viewed, a number of separate times the images was viewed, a date/time the image was viewed, and/or whether the consumer navigated to a webpage to view more information. In instances where the application **107** tracks the interaction, the application may cause the consumer device **106** to transmit periodic messages **114** to the content server **102** and/or the third-party system **112** indicative of the interaction.

In some examples, the content **108** may include instructions that activate one or more sensors on the consumer device **106** to enable a consumer to interact with the holographic image **120**. In other examples, the custom application **107** may be used to manage interaction control. In an embodiment, the content **108** may instruct the consumer device **106** to detect, through capacitance-sensing of the display screen, when a consumer touches the mobile hologram apparatus **116**. In other words, the mobile hologram apparatus **116** may comprise a three-dimensional extension of the display screen. Based on the consumer's interaction, the content **108** may include instructions that specify how the holographic image **120** is to be modified. For example, after detecting a consumer has touched a side section of the mobile hologram apparatus **116**, the consumer device **108** may detect the corresponding section of the display screen, which causes a media player or application **107** to determine that the holographic image **120** is to be rotated to face the selected section. In other examples, the application **107** may detect certain consumer touching around the mobile hologram apparatus **116**, thereby causing the holographic image **120** to rotate, enlarge, zoom-in/out, progress faster or rewind through a video, etc.

In other embodiments, the consumer device **106** may activate a camera that records a consumer's interaction with the mobile hologram apparatus **116**. The consumer device **106**, via the application **107**, for example, may use image processing to determine consumer movement with respect to the mobile hologram apparatus **116**. For instance, an imaging feature of the application **107** may include one or more rules and/or routines for identifying the mobile hologram apparatus **116** within an image. The imaging feature may also include rules and/or routines for identifying fingers, hands, pens, etc. The imaging feature may further determine a distance between the mobile hologram apparatus **116** and a consumer's fingers. The imaging feature may then determine how the distance changes over time in relation to different parts of the mobile hologram apparatus **116**. The imaging feature may also correlate the detected movement to one or more rules that specify how the holographic image **120** is to be changed or altered. For instance, based on detected movement, the application **107** may cause the holographic image **120** to rotate, pan, zoom in/out, enlarge, change colors, etc. In some instances, this interaction may also be tracked and transmitted to the content server **102** and/or the third-party system **112**.

Mobile Hologram Apparatus Embodiment

FIG. **2** shows a diagram of a sheet **200** used to form the mobile hologram apparatus **116** of FIG. **1**, according to an example embodiment of the present disclosure. It should be appreciated that the pattern depicted by the sheet **200** is only an example. In other embodiments, the sheet **200** may be configured in a different pattern that is foldable, bendable, or otherwise capable of being constructed into a mobile hologram apparatus. For example, as discussed in conjunction with FIGS. **16** to **18**, the sheet may include sections for a support stand.

The example sheet **200** of FIG. **2** includes a top section **202**, side sections **204**, and a base section **206** that comprises four base arms **208**. The sections **202**, **204**, **206**, and **208** include panels of material, preferably transparent or semi-translucent material. In some instances, the base section **206** may include an opaque material.

In the illustrated example, the mobile hologram apparatus **116** is configured to include four side sections **204** such that the top section **202** and the bottom section **206** are formed into squares. However, in other embodiments, the mobile hologram apparatus **116** may include a few as three sides or as many as ten sides. Correspondingly, the top section **202** and the base section **206** are configured to be formed into the appropriate shape (e.g., a triangle, pentagon, hexagon, etc.).

The example top section **202** is located in a middle of the sheet **200**. The four side sections **204** are configured to extend outward from the top section **202** and be separated by approximately 90 degrees. Each of the side sections **204** has a triangular-shape, which enables the side sections to be joined together to form a pyramid structure. Additionally, each of the side sections includes a first side with a tab **213** and a second side with a notch **215**. The tab **213** is configured to fit within the notch **215** of an adjacent side section when the mobile hologram apparatus **116** is formed into an uncompressed pyramid. The tab **213** and notch **215** are configured to help support and connect the side sections **204** together, thereby preventing light from escaping and ensuring the side sections are positioned at the desired angles with respect to each other.

As shown in FIG. **2**, each side section has a top edge **210** and a bottom edge **212**. The top edge **210** is configured to contact the top section **202**. The bottom edge **212** is configured to contact the respective base arm **208**. Creases **214** (or joints) are formed where the top edge **210** of the side section **204** contacts the top section **202** and where the bottom edge **212** contacts the respective base arm **208**. The creases **214** are configured to enable the side sections **204** and base arms **208** to be folded or otherwise bent to form a pyramid (or frustum) structure.

The example base arms **208** are configured to be combined or otherwise integrated together to form a square-shaped base section **206**. In the illustrated example, each of the base arms **208** has an L-shape or boot-shape. A first side **220** of the base arm **208** is relatively straight and configured to contact the crease **214** between an adjacent side section **204** and base arm **208** when the mobile hologram apparatus **116** is in an uncompressed state. For example, the first side **220** of the base arm **208***d* is configured to contact adjacent side section **204***a* and base arm **208***a* at crease **214***c* when the mobile hologram apparatus **116** is assembled and uncompressed. Such a configuration provides support for the

mobile hologram apparatus **116** and restricts how far the base arms **208** can be actuated.

Each of the base arms **208** also includes a second side **222** opposite of the first side **220**. The example second side **222** has a curved shape that enables the base arms **208** to be pressed or integrated together to form the base section **206** when the mobile hologram apparatus **116** is in the uncompressed state. For instance, in the uncompressed state, the base arms **208** contact each other at respective indentation sections **224**. It should be appreciated that the second side **222** of the base arms **208** may have any shape that enables the base arms **208** to be combined together to form the base section **206** of the mobile hologram apparatus **116**.

The example sheet **200** of FIG. **2** also includes recess sections **230** located between the base arms **208** and the side sections **204**. The recess sections **230** in the illustrated embodiment are located at the first and second sides **220** and **222** of the base arms **208**. In other examples, only one recess section may exist between the base arm **208** and the side section **204**. In these examples, the recess section **230** may be located in the middle of the connection between the base arm **208** and the side section **204**. The example recess sections **230** are configured to enable an elastic band to be placed around a perimeter of the base section **206** when the mobile hologram apparatus **116** is assembled.

The example sheet **200** of FIG. **2** is configured to be constructed from a bendable or foldable material including, for example, plastic, a plastic-polymer compound, a biological polymer, bendable glass, a carbon-based compound, bendable crystal, and/or combinations thereof. The sheet **200** may be formed by initially cutting a square or rectangle of plastic from a roll. Then, each of the sections **204** and **208** may be formed by cutting along a stencil. After the sheet **200** is cut using a stencil, the creases **214** may be formed. In other examples, the sheet **200** may be created using injection molding. In these examples, the creases **214** may be formed through the molding process or added afterwards.

The sheet **200** may have a width between 10 centimeters ("cm") and 75 cm and a length between 10 and 75 cm. It should be appreciated that the sheet **200** may be smaller than 10 cm and larger than 75 cm depending on the application. Further, the sheet **200** has a thickness between 0.1 millimeters ("mm") and 4 mm. However, the sheet may be thinner than 0.1 mm and thicker than 4 mm depending on the application.

The example sheet **200** is configured to be transparent to enable a consumer to view the internal holographic image **120**. However, the angling of the side sections **204**, despite being transparent, still causes at least some light to reflect to a center of the mobile hologram apparatus **116**. In some instances, the internally-facing side of the side sections **204** and/or the base arms **208** may be coated with a transparent or semi-transparent film that improves light reflectivity.

In some examples, the side arms **208** may be opaque to prevent overhead light from diminishing the appearance of the holographic image **120**. For example, ink or dyes may be injected into the side arms **208** during manufacture. Alternatively, an externally facing side of the side arms **208** may be coated in a film or printed. Further, the identifier **122** may be printed onto an externally-facing side of the base arms **208**.

In yet other examples, the transparent sheet **200** may be formed from a lamination of multiple layers. In these other examples, a thin opaque layer may be placed between two transparent layers in the base arms **208**. Some or all of the opaque layer may include externally-facing printed text or images. For example, the opaque layer may include a company name, company trademark, company logo, and/or one or more marketing images. In an embodiment, each of the base arms **208** may include a portion of an image that is complete when the base arms **208** are folded together to form the uncompressed pyramid structure of the mobile hologram apparatus **116**. The opaque layer may also include the identifier **122**. Further, an internally-facing side of the opaque layer or a different layer may include a film or other costing to improve light reflection within the mobile hologram apparatus **116**.

In some embodiments, an externally-facing side of the top section **202** may be coated in a film or other adhesive to improve a connection between the mobile hologram apparatus **116** and display screen of the consumer device **106**. In some instances, the film and/or adhesive may create a static-based bond with the display screen. In other instances, the film and/or adhesive may form a removable chemical bond with the display screen. In yet other instances, the top section **202** may not contain a film and/or adhesive. Further, in some sections, the top section **202** may be cut out or define a window that is framed by the top edge **210** of the side sections **204**. Moreover, in other embodiments, the top section **202** may include a window, such as a circular or square window.

Reference is made throughout to the sheet **200** being assembled into the example mobile hologram apparatus **116** and being in a compressed state (e.g., a flat configuration) or uncompressed state (e.g., a expanded configuration). FIGS. **3** to **6** show the mobile hologram apparatus **116** in a compressed state. FIG. **7** shows a transition of the mobile hologram apparatus **116** from the compressed state to the uncompressed state. FIGS. **8** to **13** show the mobile hologram apparatus **116** in the uncompressed state.

Compressed State Embodiment

FIG. **3** shows a diagram of the sheet **200** of the mobile hologram apparatus **116** of FIG. **2** in a compressed state (e.g., a compressed pyramid structure), according to an example embodiment of the present disclosure. In the compressed state, the example sheet **200** is assembled in a pyramid (or frustum) structure that is substantially flat, or where at least a height of the mobile hologram apparatus **116** in the compressed state is less than 1/10 the height of the mobile hologram apparatus **116** in the uncompressed state. For instance, in the compressed state, each of the four side sections **204** are substantially in the same plane as the top section **202**. However, in some compressed state examples, the side sections **204** may be at a slight angle (e.g., between 0 degrees and 15 degrees) from the top section **202** at the respective creases **214**.

Additionally, in the compressed state, the base arms **208** are approximately folded 180 degrees with respect to the side sections **204**. In other words, the base arms **208** are folded inwards towards the middle of the sheet **200** or towards the top section **202**. In addition, the base arms **208** overlap or interlock with each other. In some examples, the base arms **208** may be at a slight angle (e.g., between 165 degrees and 180 degrees) from the corresponding side section **204** at the respective crease **214**. Such a configuration enables the mobile hologram apparatus **116** to be substantially flat for mailing within a direct mail piece.

FIG. **3** also shows elastic band **302** (or more generally a tension mechanism) that is positioned about a perimeter of the base **206** (e.g., at the intersection of the base arms **208** and respective side sections **204**). The elastic band **302** is configured to be positioned within recessed sections **230** to

facilitate contacting the bottom edges **212** of the side sections **204** and/or portions of the base arms **208**. In some embodiments, the elastic band **302** contacts the base arms **208** at a portion that is between the recessed sections **230**. Further, the elastic band **302** is configured to be placed on the externally-facing side of the base arms **208**.

In the compressed state, shown in FIG. **3**, the elastic band **302** is stretched. Accordingly the elastic band **302** is configured to retain elasticity memory through the mailing process. The elastic band **302** may include, for example, an Aero® clear retainer elastic band. In the illustrated example, the elastic band **302** has a length of 8 cm, a width of 3 mm, and a thickness of 0.3 mm. In other example, the elastic band **302** may be dimensioned differently based on the size of the sheet **200**. The elastic band **302** may be comprised of rubber, an elastomeric plastic, an elastomeric polymer, combinations thereof, or any tension mechanism.

FIG. **4** shows a diagram of a top-down view of the mobile hologram apparatus **116** of FIG. **2** in the compressed state, according to an example embodiment of the present disclosure. The elastic bands **302** are shown circumventing the corners of the side sections **204** and base arms **208** of the sheet **200** and progressing through the recessed sections **230**. Further, in the compressed state, because the side sections **204** are substantially planar with the top section **202**, the base arms **208** are 'pushed out' from a center of the mobile hologram apparatus **116**. The mobile hologram apparatus **116** actuates to the uncompressed state by the elastic band **302** constricting against the base arms **208**, thereby causing self-actuation to form an uncompressed pyramid structure.

FIG. **5** shows a diagram of a side-profile view of the mobile hologram apparatus **116** of FIG. **2** in the compressed state, according to an example embodiment of the present disclosure. As illustrated, in the compressed state, the folded and assembled sheet **200** is substantially flat. In some embodiments, the height of the mobile hologram apparatus **116** in the compressed state is a few millimeters.

FIG. **6** shows a diagram of mobile hologram apparatus **116** of FIG. **2** in the compressed state being placed inside of direct mail piece **118**, according to an example embodiment of the present disclosure. The relatively flat nature of the mobile hologram apparatus **116** enables it to be inserted or otherwise included within direct mail pieces without incurring additional mailing costs. While the direct mail piece **118** of FIG. **6** is shown as an envelope, in other examples, the direct mail piece may include a brochure, a catalog, a magazine, a newspaper, etc.

Transition Embodiment

FIG. **7** shows a diagram of the sheet **200** of FIG. **2** between the compressed state shown in FIGS. **3** to **6** and an uncompressed state, according to an example embodiment of the present disclosure. In this example, the mobile hologram apparatus **116** is removed from the direct mail piece **118** and allowed to self-assemble or actuate into an uncompressed pyramid structure. During self-actuation, the elastic band **302** constricts against the base arms **208** at the intersection with the side sections, thereby causing the base arms **208** to move toward the center of the sheet **200**. This movement of the base arms **208** towards the center of the mobile hologram apparatus **116** causes the side sections **204** to angle upwards, which causes the top section **202** to be pushed upwards.

The elastic band **302** continues to constrict until the first side **220** of the base arms **208** contacts an adjacent base arm-side section juncture or crease **214**. At this point, the base arms **208** cannot move inward any further. Additionally, the base section **206** is substantially square.

Uncompressed State Embodiment

FIG. **8** shows a diagram of the sheet **200** of the mobile hologram apparatus **116** of FIG. **2** in an assembled, uncompressed state (e.g., an uncompressed pyramid structure), according to an example embodiment of the present disclosure. While the mobile hologram apparatus **116** appears to have a rectangular-shape, it should be appreciated that the perspective provides an appearance of elongation. However, in some embodiments, the mobile hologram apparatus **116** may actually have a rectangular-shape.

In the illustrated example, the mobile hologram apparatus **116** is shown from a bottom-perspective. In this example, the base arms **208** are compressed together. In some instances, a window **802** may exist within a center of the base section **206** at the intersection of the base arms **208**. In other instances, the window **802** may be absent with the base arms **208** overlapping at the center of the base section **206**. In the uncompressed state, the elastic band **302** continues to exert a constrictive force on the base arms **208**, which holds the mobile hologram apparatus **116** together in the uncompressed pyramid shape. As mentioned above in conjunction with FIG. **7**, the elastic band **302** causes the first side **220** of the base arms **208** to contact an adjacent base arm-side section juncture or crease **214**, which provide rigidity. Further, in the compressed configuration, the tab **213** and notch **215** are jointed together, which provides additional support for the side sections **204**.

As shown in FIG. **8**, in the uncompressed state, each of the four side sections **204** are folded at an angle of approximately 45 degrees with respect to the top section **202** and the base arms **208** at the respective creases **214**. In other examples, the slope of the angle may vary between 25 degrees to 75 degree depending on the design and dimensions of the mobile hologram apparatus **116**.

FIG. **9** shows a diagram of a top-perspective view and FIG. **10** shows a diagram of a side-profile view of the mobile hologram apparatus **116** of FIG. **8** in the assembled, uncompressed state, according to example embodiments of the present disclosure. In these figures, the top section **202** and the base section **206** are shown as having a square-shape, with the top section **202** having an area that is a fraction of the area of the base section **206**. Further, the top section **202** is aligned in parallel with the base section **206**. Moreover, as shown in FIG. **9**, the window **802** of the base section **206** is aligned with the tope section **202**.

It should be appreciated that once in the uncompressed state, the example mobile hologram apparatus **116** may be returned to the compressed state by a consumer. For instance, a consumer may apply force to the top section **202**, which causes the top section **202** to push the side sections **204** outward as the top section **202** moves towards the base section **206**. The outward force exerted by the side sections **204** causes the base arms **208** to separate and move outward, thereby extending the elastic band **302**. Compression ends when the mobile hologram apparatus **116** is substantially flat. However, once the force exerted by the consumer is removed, the mobile hologram apparatus **116** self-actuates to the uncompressed state.

FIGS. **11** to **13** show diagrams of a solid embodiment of the mobile hologram apparatus **116** of FIG. **8** in the uncompressed state, according to examples of the present disclosure. In these examples, the sheet **200** cutout perimeter lines (e.g., the first side **220** and second side **222** of the base arms

208 and the tab 213 and notch 215 of the side sections 204) are omitted to show more clearly the overall pyramid structure of the mobile hologram apparatus 116. Similar to FIG. 8, FIG. 11 shows a bottom-perspective view of the mobile hologram apparatus 116. Further, similar to FIGS. 9 and 10, FIG. 12 shows a diagram of a top-perspective view and FIG. 13 shows a diagram of a side-profile view of the mobile hologram apparatus 116. As shown in FIGS. 11 to 13, the mobile hologram apparatus 116, in the uncompressed state, has a pyramid shape with a flat top (i.e., a frustum).

It should be appreciated, that in some embodiments, the mobile hologram apparatus 116 may be constructed or formed into the solid structure shown in FIGS. 11 to 13. However, in these embodiments, the mobile hologram apparatus 116 may not be collapsible or capable of being actuated into the compressed state. In these embodiments, the mobile hologram apparatus 116 may used at promotional events and provided to consumers rather than being used in direct mail pieces.

Mobile Hologram Embodiment

FIGS. 14 and 15 show diagrams of the example mobile hologram apparatus 116 of FIG. 1 in an uncompressed state placed atop a consumer device 106, according to example embodiments of the present disclosure. In these illustrated examples, the consumer device 106 has received content 108 from a content server 102 and/or content 108 included within an identifier 122. The content 108 corresponds to an image of a vehicle, shown in the figures as holographic image 120. It should be appreciated that the vehicle shown in FIGS. 14 and 15 is one example of a holographic image. In other embodiments, the holographic image may include any two-dimensional or three-dimensional image including for example, a logo or an animated character such as Princess Leia.

As discussed above in connection with FIG. 1, after the example mobile hologram apparatus 116 self-actuates into the uncompressed state, a consumer places the example mobile hologram apparatus 116 on a display screen 1502 of the consumer device 106. In some instances, the content 108 may specify guidelines or other markers for positioning the example mobile hologram apparatus 116. Further, the top section 202 may include an adhesive to maintain a holding force between the example mobile hologram apparatus 116 and the display screen. Without the adhesive, the mobile hologram apparatus 116 may inadvertently slide over the display screen as a result of user-movement, a tilt angle of the consumer device 106, and/or wind.

A media player or application 107 on the consumer derive 106 is configured to render the content 108 into one or more images for display on the display screen 1502. Four two-dimensional images of the holographic image are displayed by the consumer device 106. The four images are configured to be aligned with the four side sections 204 of the mobile hologram apparatus 116. The four two-dimensional images may be identical or may vary to sophisticate the appearance of the holographic image 120. Light waves or beams produced by displaying the images propagate into the mobile hologram apparatus 116 and reflect off the side sections 204 and/or the base section 206. Intersections or interference of the reflected light produces a three-dimensional pattern, which is shown as the holographic image 120.

In the examples of FIGS. 14 and 15, the holographic image 120 is shown as rotating. The appearance of rotation may be caused by the media player or application 107 playing a sequence of images of a rotating vehicle. Alternatively, the media player or application 107 may play a video (essentially a sequence of images), that shows the vehicle rotating. In some embodiments, the appearance of rotation may be caused by a consumer touching or gesturing near, for example, the side sections 204 of the mobile hologram apparatus 116. In other embodiments, the application 107 or more generally, the display screen 1502 may display control features that enable a consumer to manipulate the holographic image 120, including, for example, rotate, zoom, pan, enlarge, fast forward, rewind, next image, next video, etc.

Alternative Mobile Hologram Sheets

The mobile hologram sheet 200 of FIG. 2 provides one example for creating the example mobile hologram apparatus 116. However, other designs may be used and the features and benefits of the example mobile hologram apparatus 116 disclosed herein are not limited to any particular design. For example, FIGS. 16 to 18 show diagrams of alternative sheets 1600 and 1800 that may be used to create mobile hologram apparatuses, according to example embodiments of the present disclosure.

Specifically, FIG. 16 shows a diagram of a sheet 1600 that is foldable into an octahedron with flat top and bottom (e.g., a dual-frustum). Similar to the sheet 200 of FIG. 2, the sheet 1600 includes a top section 1602 and side sections 1604. However, instead of base arms 208, the sheet 1600 includes lower side sections 1606 and a lower section 1608. Further, the sheet 1600 includes a stand section 1610. Unlike the example shown in FIG. 2, the top section 1602 is not placed on the consumer device 106. Instead, lower sections 1608 and stand 1610 are placed on the display screen of the consumer device 106.

FIG. 17 shows a diagram of the sheet 1600 folded or assembled into an uncompressed structure to form a mobile hologram apparatus 1700. As shown in FIG. 17, the lower side sections 1606 in conjunction with the lower section 1608 form a second pyramid structure. Depending on the angle of light beams from the consumer device 106, the illustrated mobile hologram apparatus 1700 may display a holographic image within the side sections 1604 and/or within the lower side sections 1606. Alternatively, a holographic image may be displayed within a middle of the mobile hologram apparatus 1700.

As illustrated in FIG. 17, the lower sections 1608 are joined together at the stand section 1610. The connection of the lower sections 1608 within the stand 1610 holds the sheet 1600 together in a compressed and uncompressed state. The example stand section 1610 is configured to provide support for the mobile hologram apparatus 1700 when placed on the consumer device 106. The stand section 1610 may also be used to align the mobile hologram apparatus 1700 with the image displayed on the consumer device 106.

Another difference between sheets 200 and 1600 is the placement location of the elastic band. Instead of placing the elastic band around a perimeter of the base section 206, in the embodiment of FIGS. 16 and 17, an elastic band 1702 is configured to run through a center of the mobile hologram apparatus 1700. For instance, side sections 1604*b* and 1604*d* include tabs 1620*a* and 1620*d* that are configured to fold inward. The tabs 1620 include through holes configured to accept ends of the elastic band 1702, as illustrated in FIG. 17. The elastic band 1702 is configured to pull the opposite sides of the mobile hologram apparatus 1700 toward each

other, which causes the mobile hologram apparatus **1700** to actuate from a compressed state to an uncompressed state.

FIG. **18** shows a diagram of another sheet **1800** that may be used to create a mobile hologram apparatus. In this example, the sheet **1800** comprises a dual set of top sections **1802** and side sections **1804**, which are used to form an octahedron with flat top and bottom (e.g., a dual-frustum), similar to FIG. **16**. In addition, the sheet **1800** includes a stand section **1810**. A base section **1812** is also included, which is connected to the stand section **1810** to secure the mobile hologram apparatus in a compressed or uncompressed state.

Further, the sheet **1800** includes tab sections **1820** that are used to secure an elastic band. For instance, the tab sections **1820***a* and **1820***b* are jointed together when the mobile hologram apparatus is assembled. Tab sections **1820***c* and **1820***d* are also joined together. An elastic band is connected to the through holes of tab sections **1820***b* and **1820***d*. Similar to the mobile hologram apparatus **1700** of FIG. **17**, the elastic band is configured to pass through the middle of the mobile hologram apparatus created from the sheet **1800** of FIG. **18**. The compression of the side sections **1804***b*, **1804***d*, **1804***f*, and **1804***h* causes the mobile hologram apparatus to actuate from a compressed to an uncompressed state.

Alternative Deployment Embodiment

As discussed above in conjunction with FIGS. **1** to **18**, the mobile hologram apparatus includes an elastic band or tension mechanism to cause automatic self-assembly or self-actuation from a compressed state to uncompressed state. However, in some embodiments, the mobile hologram apparatus may be configured to be opened to an uncompressed state by a consumer. In these embodiments, the elastic band is omitted and replaced with sections, tabs, or panels that enable the mobile hologram apparatus to be secured in the uncompressed state. For example, the mobile hologram apparatus may include one or more tabs or panels that are moved after the mobile hologram apparatus is opened into the uncompressed state. The movement of the tabs or panels may lock or restrict the mobile hologram apparatus from falling back into the compressed state. The movement of the tabs or panels may be caused by the consumer or may be configured to move automatically after the mobile hologram apparatus is opened to the compressed state. For example, a tab may lock base arms **208** of FIG. **2** in place. The tabs and/or panels may be released by the consumer to enable the mobile hologram apparatus to be placed back into the compressed state.

Flowcharts of the Example Processes

FIG. **19** illustrates a flow diagram showing an example procedure **1900** to create the mobile hologram apparatus **116** of FIGS. **1** to **15**, according to an example embodiment of the present disclosure. Although the procedure **1900** is described with reference to the flow diagram illustrated in FIG. **19**, it should be appreciated that many other methods of performing the steps associated with the procedure **1900** may be used. For example, the order of many of the blocks may be changed, certain blocks may be combined with other blocks, and many of the blocks described are optional. Further, the actions described in procedure **1900** may be performed among multiple devices including, for example a plastic sheet forming machine, a plastic sheet folding machine, and a plastic sheet packaging machine.

The procedure **1900** begins when the example sheet **200** of FIG. **2** is created, fabricated, or molded (block **1902**). In some examples, the sheet **200** may be formed into the predefined shape shown in FIG. **2**. Further the sheet **200** may be formed with the creases **214**. In other examples, the sheet **200** may be cut from a rectangular plastic sheet using a stencil or programmed routine. After the sheet **200** is cut, the creases may be added. In some instances, the sheet **200** may be formed from more than one layer. In these instances, the layers are connected together. In some instances, opaque layers are added to base arms or other sections. At this point, the sheet may be printed or otherwise coated with ink, film, or other materials to incorporate marketing or promotional information or improve light reflectivity. In addition, an identifier **122** may also be printed or otherwise connected to the mobile hologram apparatus **116**.

After the sheet **200** is formed, the sheet **200** is folded or assembled into an uncompressed pyramid structure to create the mobile hologram apparatus **116** (block **1904**). An elastic band is then placed along a perimeter of a base of the mobile hologram apparatus **116** (block **1906**). The mobile hologram apparatus **116** is then placed into the compressed state and placed inside or within a direct mail piece (blocks **1908** and **1910**). The mobile hologram apparatus **116** is next mailed within the direct mail piece to a consumer (block **1912**). The example procedure **1900** then ends with respect to manufacture of the particular mobile hologram apparatus **116**.

In some embodiments, the mobile hologram apparatus **116** may be sent to another party that is responsible for creating direct mail pieces. In these examples, the mobile hologram apparatus **116** is shipped, after being manufactured into the assembled, compressed state. The party responsible for assembling or creating the direct mail pieces may then incorporate the mobile hologram apparatus **116** with the direct mail piece.

FIG. **20** illustrates a flow diagram showing example procedures **2000** and **2050** to display content using the mobile hologram apparatus **116** of FIGS. **1** to **15**, according to example embodiments of the present disclosure. Although the procedures **2000** and **2050** are described with reference to the flow diagram illustrated in FIG. **20**, it should be appreciated that many other methods of performing the steps associated with the procedures **2000** and **2050** may be used. For example, the order of many of the blocks may be changed, certain blocks may be combined with other blocks, and many of the blocks described are optional. Further, the actions described in the procedures **2000** and **2050** may be performed among multiple devices including, for example a third-party system **112**.

The procedure **2000** of FIG. **20** begins when a consumer receives a direct mail piece and removes the mobile hologram apparatus **116**. When removed, the mobile hologram apparatus **116** is in a compressed state. However, after being removed by the consumer, the mobile hologram apparatus **116** self-actuates and automatically opens from the compressed state to the uncompressed state (block **2002**). The consumer then uses the consumer device **106** to scan an identifier **122** on the mobile hologram apparatus **116** and/or the direct mail piece (block **2004**). Scanning the identifier **122** enables the consumer device **106** to determine an address or location of a content server **102** that is storing related content. The consumer device transmits a request message **110** to the identified content server **102** that includes an identifier, code, or address of content related to the identifier **122**. In instances where the content is included within the identifier, a request message is not transmitted.

After transmitting the message **110**, the example consumer device **106** receives one or more messages from the content server **102** that include the content **108**. The consumer device **106** uses a media player or application **107** to display the received content **108** (block **2006**). A consumer then places the mobile hologram apparatus **116** on top of a display screen of the consumer device **106**, which causes a holographic image **120** to form within the mobile hologram apparatus **116** (block **2008**). After the holographic image **120** is displayed, the example procedure ends **2000**. However, in some embodiments, the consumer device **106** and/or application **107** may monitor and record the consumer's interaction with the mobile hologram apparatus **116** and any subsequent product/service engagement or purchase.

In some examples, the consumer device **106** may delay playing the content **108** until the mobile hologram apparatus **116** is placed on top of the display screen. For instance, the consumer device **106** may use capacitive sensing within the display screen or proximity sensing using a camera to determine when the mobile hologram apparatus **116** is in place. Alternatively, the consumer device **106** may display a play button that is pressed by the consumer after the mobile hologram apparatus **116** is placed on the display screen of the consumer device.

In further examples, the consumer device **106** may include instructions or routines that determine a position of the mobile hologram apparatus **116** with respect to the screen using for example, capacitive sensing or analysis of images recorded by a camera. The consumer device **106** may then display instructions for positioning the mobile hologram apparatus **116** within guidelines. Alternatively, the mobile hologram apparatus **116** may cause the content **108** to be displayed at the location of the mobile hologram apparatus **116**. In these alternative instances, the consumer device **106** and/or the application **107** may track any movement of the mobile hologram apparatus **116** along the display screen and adjust where the image is displayed on the screen so that the image is continuously displayed within the mobile hologram apparatus **116**.

The procedure **2050** of FIG. **20** begins when the content server **102** receives a message **110** from the consumer device that identifies content (block **2052**). The message **110** includes an identifier of the content or a code related to the content. The content server **102** accesses a memory or database to determine a location of the related content **108** (block **2054**). The content server **102** then transmits one or more messages (or file(s)) that include a copy of the requested content **108** to the consumer device **106** (block **2056**). In some instances, the content **108** may also include instructions for rendering or changing the display of the content based on conditions or input from a consumer. The example procedure **2050** then ends.

CONCLUSION

It will be appreciated that all of the disclosed methods and procedures described herein can be implemented using one or more computer programs or components. These components may be provided as a series of computer instructions on any computer-readable medium, including RAM, ROM, flash memory, magnetic or optical disks, optical memory, or other storage media. The instructions may be configured to be executed by a processor, which when executing the series of computer instructions performs or facilitates the performance of all or part of the disclosed methods and procedures.

It should be understood that various changes and modifications to the example embodiments described herein will be apparent to those skilled in the art. Such changes and modifications can be made without departing from the spirit and scope of the present subject matter and without diminishing its intended advantages. It is therefore intended that such changes and modifications be covered by the appended claims.

The invention is claimed as follows:

1. A mobile hologram sheet apparatus comprising:

a square-shaped top section located within a middle of the mobile hologram sheet apparatus;

four trapezoidal-shaped side sections each having a bottom edge and a top edge, the bottom edge being longer than the top edge, each of the side sections connected at the respective top edge to the top section at separate sides of the top section;

four base arms each respectively connected to the bottom edge of one of the side sections at junctions such that a base arm is connected to each side section at a respective junction, each base arm having an L-shape such that a bottom of the L-shape is connected to the bottom edge of the corresponding side section; and

a first four preformed creases located at respective junctions between each of the top edges of the four side sections and the top section,

wherein each junction between each of the side sections and the respective base arms includes a second preformed crease and at least one recess section that provides a gap between a portion of the side section and the respective base arm, and

wherein a diameter of the top section is less than a length of each of the bottom edges of the side sections.

2. The mobile hologram sheet apparatus of claim **1**, wherein the sheet apparatus includes at least one of a plastic, a biological polymer, glass, a carbon-based compound, crystal, and combinations thereof.

3. The mobile hologram sheet apparatus of claim **1**, wherein the sheet apparatus, when unfolded has a length between 10 centimeters ("cm") and 75 cm across opposing base arms, and a width between 10 cm and 75 cm across opposing base arms.

4. The mobile hologram sheet apparatus of claim **1**, wherein a material forming the sheet apparatus has a thickness between 0.1 millimeters ("mm") and 4 mm.

5. The mobile hologram sheet apparatus of claim **1**, wherein the material forming the sheet apparatus is transparent.

6. The mobile hologram sheet apparatus of claim **1**, wherein an exterior of the top section includes a transparent adhesive.

7. The mobile hologram sheet apparatus of claim **1**, wherein each of the base arms includes:

a first side edge configured to contact one of the second preformed creases at a junction of one of the adjacent side sections and base arms; and

a second side edge opposite the first side edge having a curved shape that enables the base arms to interconnect together when folded.

8. The mobile hologram sheet apparatus of claim **1**, wherein each junction between each of the side sections and the respective base arms includes two recess sections that are on opposite sides of the respective second preformed crease.

9. The mobile hologram sheet apparatus of claim **1**, wherein the at least one recess section is dimensioned to

enable an elastic band to pass through and contact the respective second preformed crease.

10. The mobile hologram sheet apparatus of claim **1**, wherein the base arms include at least one of an opaque paint, an opaque film, an opaque sticker, an opaque print, or an opaque dye, and

wherein the top section and the side sections are transparent.

11. The mobile hologram sheet apparatus of claim **1**, wherein an exterior of the base arms is opaque and an interior of the base arms is reflective.

12. A mobile hologram sheet apparatus comprising:

a square-shaped top section located within a middle of the mobile hologram sheet apparatus;

four trapezoidal-shaped side sections each having a bottom edge and a top edge, the bottom edge being longer than the top edge, each of the side sections connected at the respective top edge to the top section at separate sides of the top section; and

four base arms each respectively connected to the bottom edge of one of the side sections at junctions such that a base arm is connected to each side section at a respective junction

wherein a diameter of the top section is less than a length of each of the bottom edges of the side sections, and

wherein each junction between each of the side sections and the respective base arms includes a preformed crease and at least one recess section that provides a gap between a portion of the side section and the respective base arm.

13. The mobile hologram sheet apparatus of claim **12**, wherein the at least one recess section is dimensioned to enable an elastic band to pass through and contact the respective preformed crease.

14. The mobile hologram sheet apparatus of claim **12**, wherein the sheet apparatus includes at least one of a plastic, a biological polymer, glass, a carbon-based compound, crystal, and combinations thereof.

15. The mobile hologram sheet apparatus of claim **12**, wherein the sheet apparatus, when unfolded has a length between 10 centimeters ("cm") and 75 cm across opposing base arms, and a width between 10 cm and 75 cm across opposing base arms, and

wherein a material forming the sheet apparatus has a thickness between 0.1 millimeters ("mm") and 4 mm.

16. The mobile hologram sheet apparatus of claim **12**, wherein the base arms include at least one of an opaque paint, an opaque film, an opaque sticker, an opaque print, or an opaque dye, and

wherein the top section and the side sections are transparent.

17. The mobile hologram sheet apparatus of claim **12**, wherein an exterior of the base arms is opaque and an interior of the base arms is reflective.

18. The mobile hologram sheet apparatus of claim **12**, further comprising:

second preformed creases located at respective junctions between each of the top edges of the four side sections and the top section.

19. The mobile hologram sheet apparatus of claim **18**, wherein each of the base arms includes:

a first side edge configured to contact one of the preformed creases at the respective junction of one of the adjacent side sections and base arms; and

a second side edge opposite the first side edge having a curved shape that enables the base arms to interconnect together when folded.

20. The mobile hologram sheet apparatus of claim **18**, wherein each junction between each of the side sections and the respective base arms includes two recess sections that are on opposite sides of the respective preformed crease.

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